INSTRUCTION BOOK

FOR

RADIO TRANSMITTER BC-365-C

AND

REMOTE CONTROL UNIT RM-10-C

MANUFACTURED BY

FEDERAL TELEGRAPH COMPANY
NEWARK, NEW JERSEY, U. S. A.

PUBLISHED BY AUTHORITY

OF

THE CHIEF SIGNAL OFFICER

ORDER No. 6849-NY-41

INSTRUCTION BOOK

FOR

RADIO TRANSMITTER BC-365-C

AND

REMOTE CONTROL UNIT RM-10-C

MANUFACTURED BY

FEDERAL TELEGRAPH COMPANY
NEWARK, NEW JERSEY, U. S. A.

PUBLISHED BY AUTHORITY

OF

THE CHIEF SIGNAL OFFICER

ORDER No. 6849-NY-41

SAFETY NOTICE

This equipment employs high voltages which are DANGEROUS if contacted by operating personnel. The doors of the equipment are provided with electrical interlocks which remove all plate voltages whenever doors are opened. However, OPERATING PERSONNEL SHOULD ALWAYS GROUND ANY PART OF THE EQUIPMENT BEFORE TOUCHING IT. If any door is to be opened, ALL POWER SHOULD FIRST BE REMOVED FROM THE TRANSMITTER by throwing the MAIN DISCONNECT SWITCH to the OFF position.

TABLE OF CONTENTS

	Page
TITLE PAGE	1
SAFETY NOTICE	2
TABLE OF CONTENTS	3
LIST OF ILLUSTRATIONS	5
A. DESCRIPTION OF EQUIPMENT	7
1. GENERAL CHARACTERISTICS	7
a List of Components with Size and Weight	7
b Vacuum Tube Complement	7
c Performance Characteristics	7
2. DESCRIPTION OF RADIO TRANSMITTER BC-365-C	8
a Mechanical Construction and Arrangement	8
b Detailed Circuit Description	8
3. DESCRIPTION OF REMOTE CONTROL UNIT RM-10-C	12
a Mechanical Construction and Arrangement	12
b Circuit Description	12
B. INSTRUCTIONS FOR INSTALLATION	13
1. INITIAL PROCEDURE	13
a Preferred Site and Layout	13
b Unpacking the Equipment	13
2. INSTALLATION	13
a Mounting the Equipment	13
b Connection of External Wiring	14
C. ADJUSTMENT AND OPERATION	14
1. PREPARATION FOR USE	14
2. OPERATION	15
a Precautions and Special Instructions	15
b Starting the Equipment	15
c Stopping the Equipment	15
d Tuning Radio Transmitter BC-365-C	16
e To Change Frequency	18
f Other Functions	18
g Neutralization of Amplifier Stages	18
h Set of Typical Test Data	19
D. MAINTENANCE AND REPAIR	20
1. ROUTINE MAINTENANCE	20

Table of Contents

		Page
a	Cleanliness	20
b	Relay and Contactor Maintenance	20
c	Checking Meter Readings	20
d	Vacuum Tube Inspection	21
e	Lubrication	21
f	Checking Fuses	21
2.	LIST OF POSSIBLE TROUBLES AND REMEDIES	21
E.	APPENDIX	23
1.	PARTS LIST	23
a	Radio Transmitter BC-365-C	23
b	Remote Control Unit RM-10-C	32
c	List of Manufacturers Names and Addresses	33
2.	SPARE PARTS LIST	34

LIST OF ILLUSTRATIONS

DIAGRAMS

Fig. 1 Radio Transmitter BC-365-C, Outline Dimensional Drawing

Fig. 2 Remote Control Unit RM-10-C, Outline Dimensional Drawing

Fig. 3 Radio Transmitter BC-365-C and Remote Control Unit RM-10-C, External Connections Diagram

Fig. 4 Radio Transmitter BC-365-C, Typical Calibration Curve, Master Oscillator

Fig. 5 Radio Transmitter BC-365-C, Typical Calibration Curve, Intermediate Amplifier

Fig. 6 Radio Transmitter BC-365-C, Typical Calibration Curve, Power Amplifier, Ranges 1 and 2

Fig. 7 Radio Transmitter BC-365-C, Typical Calibration Curve, Power Amplifier, Ranges 3 and 4

Fig. 8 Radio Transmitter BC-365-C, Typical Calibration Curve, Power Amplifier, Ranges 5 and 6

Fig. 9 Radio Transmitter BC-365-C, Typical Calibration Curve, Antenna Circuit

Fig. 10 Radio Transmitter BC-365-C and Remote Control Unit RM-10-C, Functional Diagram of Control and Power Circuits

Fig. 11 Radio Transmitter BC-365-C and Remote Control Unit RM-10-C, Schematic Wiring Diagram

Fig. 12 Radio Transmitter BC-365-C, Practical Wiring Diagram

Fig. 13 Remote Control Unit RM-10-C, Practical Wiring Diagram

PHOTOGRAPHS

Fig. 14 Radio Transmitter BC-365-C, Front View, and Spare Parts Box

Fig. 15 Radio Transmitter BC-365-C, Right Side View

Fig. 16 Radio Transmitter BC-365-C, Left Side View

Fig. 17 Radio Transmitter BC-365-C, Rear View

Fig. 18 Remote Control Unit RM-10-C, Front View, and Rear View with Cover Removed

MISCELLANEOUS ILLUSTRATIONS

Fig. 19 Radio Transmitter BC-365-C, Remote Control Relay

Fig. 20 Radio Transmitter BC-365-C, Filament Contactor

Fig. 21 Radio Transmitter BC-365-C, Plate Contactor

Fig. 22 Radio Transmitter BC-365-C, Overload Relay

Fig. 23 Radio Transmitter BC-365-C, Time Delay Relay

A. DESCRIPTION OF EQUIPMENT

1. GENERAL CHARACTERISTICS

a List of Components with Size and Weight.

Unit	Size	Weight
Radio Transmitter BC-365-C	28" x 26" x 76" high	570 lbs.
Remote Control Unit RM-10-C	19" x 1-15/16" x 1-3/4"	1.15 lbs.
Spare Parts in Box	23-1/2" x 13-1/2" x 12-1/4"	57 lbs.
Two Sets of Vacuum Tubes		
Three Instruction Books for Radio Transmitter BC-365-C and Remote Control Unit RM-10-C		

b Vacuum Tube Complement.- The following tubes are employed in Radio Transmitter BC-365-C. No tubes are required for Remote Control Unit RM-10-C.

Position	No. Used	Signal Corps Type No.	Commercial Type No.
Oscillator	1	VT-143	805 or 905
Keyer	1	VT-143	805 or 905
Intermediate Amplifier	1	VT-143	805 or 905
Power Amplifier	4	VT-143	805 or 905
Bias Rectifier	2	VT-46-A	866-A or 966-A
Plate Rectifier	2	VT-42-A	872-A or F-353-A

c Performance Characteristics.

(1) Frequency Range.- The frequency range is continuous, controllable from the front panel, from 150 kc to 550 kc.

(2) R-F Output.- The nominal rated r-f output is 350 watts into an antenna of 8 ohms resistance and 750 mmf capacitance. Any antenna may be used which has an effective resistance of 6 to 12 ohms and an apparent capacity of 750 to 3000 mmf.

(3) Type of Circuit.- The r-f circuit consists of a master oscillator, intermediate amplifier, and power amplifier. Two self-contained power supplies furnish d-c plate and bias voltages. No modulating equipment is provided, the transmitter being for CW only.

(4) Keying.- A separate keyer tube is provided in the cathode circuit of the master oscillator. The transmitter may be keyed at speeds up to 200 words per minute. No relays or external voltages are required.

(5) Power Input Requirements.- The entire transmitter operates from a single phase, 60 cycle source, of either 110 volts or 220 volts. The required input power is approximately 1800 watts maximum, at a power factor of 95%.

2. DESCRIPTION OF RADIO TRANSMITTER BC-365-C

a Mechanical Construction and Arrangement.- A front view of Radio Transmitter BC-365-C is shown in Fig. 14. The equipment is contained in a single cabinet with all controls mounted on the front panel.

The general arrangement of the equipment within the cabinet is shown in the side views Fig. 15 and Fig. 16 and the rear view Fig. 17. Power components are mounted towards the bottom of the cabinet on the two lower shelves. The next shelf contains the master oscillator to the left, separated by a shield from the intermediate amplifier components on the right. The power amplifier components are mounted on the upper shelf to the right of the antenna tuning elements.

The two sides of the cabinet are equipped with hinged doors and the internal parts are arranged for maximum accessibility. Tubes are immediately adjacent to the doors on either side. Interlock switches are provided to prevent operating personnel from accidentally coming in contact with high voltage.

In the front view, Fig. 14, the main line switch and the plate rectifier overload relay may be seen on the lower part of the front panel. The filament rheostat is located above this in line with the local filament and plate control switches and the test key. Indicating lights are located above the filament and plate switches, respectively. Above these on the left side are located the master oscillator controls, consisting of a range switch and the tuning control. Similar controls are on the right for the intermediate amplifier. The power amplifier tank circuit is arranged as a "pi" network consisting of an input capacitor, a variometer tuning element and an antenna coupling capacitor. Controls for the input capacity and for tuning are located on the upper right side of the panel. The antenna coupling controls are in the upper center and the antenna tuning controls are on the left. These antenna tuning controls consist of a loading coil switch and a fine and coarse tuning control.

Meters are provided to read the current or voltage of all important circuits. These include the oscillator plate current, intermediate amplifier plate current, power amplifier plate current, antenna current, filament voltage, bias voltage and plate voltage.

Adequate overload protective devices are included in the various circuits. Fuses mounted on the terminal board and readily accessible protect filament, bias rectifier, plate rectifier and control relay circuits. The plate supply rectifier also includes an overload relay of the automatic reset type.

The antenna connection is made to an insulator on the top of the cabinet. All other external connections are made to a terminal board located near the bottom of the cabinet. On this same terminal board are located the links for changing the transformer taps for either 110 or 220 volt operation.

b Detailed Circuit Description.

(1) Master Oscillator.- The master oscillator consists of a Tube VT-143 (commercial type 805 vacuum tube) V-1, connected in a circuit designed for the maximum of stability without recourse to temperature control. The schematic wiring diagram, Fig. 11, shows the arrangement of the circuit. The type of oscillator is known as a "Colpitts", using coils L-3 and L-4, tuned by variable capacitor C-7. Seven capacitors C-9, C-10, C-11, C-12, C-13, C-14 and C-15 are also connected in series across C-7 and form a voltage dividing network to secure the proper values of grid and plate excitation to the oscillator and also the proper value of

grid excitation to the following intermediate amplifier tube. The range switch S-1 is arranged to connect coils L-3 and L-4 in either series or parallel or in individual connections so as to give the required band ranges. The range switch also connects into the circuit a fixed air capacitor C-6 for additional capacity in the low frequency ranges. This capacitor has been adjusted and the rotor fastened at the correct position (rotor plates approximately 88% meshed with the stator). This setting should not be disturbed. To secure stability of frequency the vacuum tube is lightly loaded and operated at a low value of plate current. The tank coils are made by cementing a Litz wire to special low temperature coefficient ceramic forms and the circuit is further compensated by means of a compensating condenser C-8, connected across the coils. The air capacitor C-19, connected in series with this compensating capacitor, is adjusted and locked at the factory so as to give the correct temperature coefficient of capacity. The setting of this capacitor should not be disturbed but should remain at its present position in which the rotor plates are approximately 91% meshed with the stator. The continuous frequency range of 150 to 550 kc is obtained from the front panel in six steps of switch S-1 with continuous coverage between steps given by the tuning capacitor C-7.

(2) Intermediate Amplifier.- The vacuum tube V-2 used in the intermediate amplifier is also a Tube VT-143 (commercial type 805 vacuum tube). This stage is tuned by means of inductors L-6 and L-7 and variable capacitor C-21. The range switch S-2 selects the proper taps on the tuning inductors and the tuning capacitor C-21 gives continuous coverage between taps. Nine capacitors, C-22 to C-30, inclusive, are connected across the tank circuit in a voltage dividing network to give the proper excitation and neutralizing voltage for the power amplifier. Resistor R-2 is connected in the grid lead to the vacuum tube to prevent parasitic oscillations and the stage is neutralized in conventional fashion by means of capacitor C-16. Grid bias is obtained from a tap on the voltage divider of the bias power supply and is of such a value that the intermediate amplifier tube operates as a Class "B" amplifier. This method of operation maintains a more constant loading on the oscillator than a conventional Class "C" amplifier would provide.

(3) Power Amplifier.- The power amplifier stage of this transmitter consists of four Tubes VT-143 (commercial type 805 vacuum tubes), V-3, V-4, V-5 and V-6, connected in parallel. Fixed bias is provided by the bias supply and some additional self-bias is obtained from the grid resistors R-3 and R-18. Parasitic suppression resistors R-4 and R-5 are connected in the grid leads and the stage is neutralized in order to prevent undesirable reaction on the preceding stage. The plate tank circuit is a standard "pi" network chosen for its ability to suppress harmonics and to give capacitive coupling to the antenna. This type of "pi" section is a low-pass filter consisting of a shunt capacitor input, an inductive series arm, and a shunt capacitor output across which the antenna load is connected. The degree of coupling to the antenna is determined by the ratio of the input capacity to the output capacity. In this particular circuit the input capacity is composed of capacitors C-38, C-39 and C-41. These three capacitors are connected into the circuit in various combinations by means of the switch S-3. The series inductive arm is a variometer L-11, provided with taps brought out to the range switch S-4. The variometer tuning control provides continuous frequency coverage between coil taps. The output capacitor arm of the network consists of capacitors C-42, C-44, C-45, C-46, C-55, C-56 and C-57. These seven capacitors are connected into this circuit in various combinations by means of the antenna coupling switches S-5 and S-16.

(4) Antenna Tuning Circuit.- To provide antenna tuning and proper loading of the power amplifier a variometer or loading coil L-12 is provided within the

cabinet. This loading coil provides sufficient inductance to properly tune an antenna having an apparent capacity between the limits of 750 and 3000 mmf. Three front panel controls are used to secure this range of inductance. Coarse coil taps are secured by the antenna loading switch S-7. Fine coil taps are secured by control switch S-6, designated antenna tuning B, and intermediate coverage is secured by the variometer rotor control, designed antenna tuning A.

(5) Keyer Tube.- To provide for high-speed keying of the transmitter, a keyer tube V-7 is employed in the filament center tap to ground circuit of the master oscillator stage. With the key up, the grid of this keyer tube is provided with a negative voltage from the bias rectifier which cuts off the plate current of the keyer tube. As the keyer tube space current provides a bias drop for the oscillator stage, the plate current of this oscillator stage is automatically cut off when its bias is increased, due to cutting off plate current flow through the keyer tube. This provides good keying wave form for high-speed transmission and provides a method of keying whereby the current broken by the key is small enough to prevent serious arcing at the key contacts.

(6) Power Supplies.- Separate rectifiers are provided for the bias supply, plate voltage supply and remote control voltage supply.

The bias voltage supply consists of two Tubes VT-46-A (commercial type 866-A mercury vapor rectifier), V-8 and V-9, in a single-phase full wave circuit. The filter for this rectifier consists of a one-section low-pass filter made up of reactor CH-2 and capacitor C-49. A tapped bleeder load is provided across the output of the rectifier filter so that it is possible to obtain two values of bias voltage. This bleeder is shown as R-12 and R-13 on the schematic diagram Fig. 11.

The plate voltage supply employs two Tubes VT-42-A (commercial types F-353-A or 872-A mercury vapor rectifier), V-10 and V-11, in a single phase full wave circuit. A filter of special design is provided to reduce transients due to keying, to keep the regulation of the power supply to a minimum, and also to obtain a low ripple voltage in the output of the rectifier. To obtain all of these characteristics a special filter section is employed. This consists of a reactor CH-3 tuned by capacitor C-36 in series with resistor R-19. The purpose of the series resistor R-19 is to prevent a serious overload surge to the rectifier tubes at the instant of starting up the rectifier. If this resistor were not present, the current through C-36, C-51 and C-53 in series, would exceed the peak plate current rating of the rectifier tube. The tuned filter circuit is resonated to a frequency of 120 cycles, which is the principal ripple frequency. Across the output of this filter, resistors R-14, R-15, R-16 and R-17 form a bleeder load to improve the regulation, drain the charge in capacitors C-51 and C-53 and to provide an intermediate voltage for the plate of the master oscillator tube.

The main plate transformer T-4 is provided with various taps on the primary winding to provide for various line voltages. In addition, an extended primary winding is brought out to the tune-operate switch S-15, so that when the TUNE-OPERATE switch is in the TUNE position, the output voltage of the plate supply rectifier will be reduced to approximately two-thirds the normal full load voltage.

The remote control voltage supply employs a rectox type of rectifier, connected across an isolated secondary winding on the auto transformer T-1. This rectox unit Z-1 provides a supply of approximately 70 volts direct current for control of the transmitter from the remote position. The d-c output voltage is adequately filtered by means of reactor CH-1 and capacitor C-48. Good regulation is assured by a bleeder resistor R-8. The transformer winding to which the rectox

unit is connected is provided with several taps. The proper tap has been selected at the factory and this connection should not be changed for some time. However, after a period of several years, as the rectox unit ages, its voltage output will become less and it may then be necessary to select a higher voltage tap on the transformer winding to secure the correct value of remote control voltage.

(7) Protective Devices.- Each principal circuit of the transmitter is carefully fused to protect the equipment in case of tube failure, etc. This includes a fuse F-1 in the primary of the auto transformer T-1, fuses F-2 and F-3 in the primary of the filament transformer T-2, fuses F-4 and F-5 in the primary circuit of the plate transformer T-4, fuses F-6 and F-7 in the primary circuit of the bias transformer T-3, and fuse F-8 in the filament and plate contactor circuit.

An overload relay RL-4 is provided to protect the plate voltage supply rectifier in case of overload in the d-c plate voltage circuit. This overload relay is connected in the negative return circuit of the rectifier and has been adjusted to operate at 1.3 amperes. The setting of the overload relay, located on the front panel, may be adjusted so that the relay will operate at any value of current between the limits of approximately .5 amperes and 2.0 amperes.

In order to prevent the operation of the plate supply rectifier or bias supply rectifier before the filaments of the mercury vapor rectifier tubes become sufficiently heated, a time-delay relay RL-5 is provided. The mercury type delay relay causes a delay of approximately 30 seconds after the filament switch is closed before plate voltage may be applied.

Door interlock switches S-13 and S-14 are provided to prevent the application of plate voltage when the doors are opened. These switches are connected in the coil circuit of the plate supply contactor so that personnel may not be exposed to high voltages with the doors of the transmitter open.

(8) Control and Power Circuits.- A functional diagram of the control and power circuits is shown in Fig. 10. The sequence of operation of the components shown in this diagram is as follows:

In normal operation the main line switch S-10 is left closed. Thus, 220 (or 110) volts is available at transformer T-1 for operation of the rectox control voltage supply. In starting the transmitter from Remote Control Unit RM-10-C, the control switch S-8 is closed. This will complete the circuit through the remote control relay RL-1, the rectox unit and ground, so that relay RL-1 will operate. This completes the circuit to the filament contactor and applies filament voltage to the primary of the filament transformer T-2. The green indicating light on the front panel will then light and, since the time delay relay RL-5 is connected in parallel with the filament transformer primary, the enclosed plunger of this relay will start to move. After approximately 30 seconds the time delay relay will close its contacts. If the transmitter doors are closed so that switches S-13 and S-14 are making contact, the plate contactor RL-3 will now operate, thus applying primary voltage to the plate transformer T-4 and the bias transformer T-3. The red indicating lamp in parallel with transformer T-4 will light, indicating that plate voltage has been applied. The transmitter may then be keyed by a key inserted in jack J-1 on the remote control unit. If the control switch S-8 is now opened the control relay RL-1 will be de-energized, thus allowing all relays and contactors to return to their normal position and the transmitter will be completely shut down. In the preceding discussion it will be noted that opening remote switch S-8 shuts down the entire transmitter and when S-8 is again closed a delay of 30 seconds will elapse before the plate power comes

on. If it is desired to control only plate voltage from the remote control position then the local filament switch S-11 should be left in the ON position. The filaments of the vacuum tubes will then remain lit and plate voltage will be instantaneously available when switch S-8 is closed.

When operating the transmitter from the local position the remote control relay RL-1 and the remote filament contactor RL-2 do not operate. The local filament and plate switches S-11 and S-12 are in shunt with the contacts of the remote filament contactor RL-2 and therefore serve the functions performed by relay RL-2 when operating from the Remote Control Unit RM-10-C. Closing the local filament switch S-11 completes the primary circuit directly to the filament transformer, thus applying filament voltage and causing the time delay relay to begin its cycle. The local plate switch S-12 completes the circuit to the plate contactor RL-3, thus allowing the plate contactor to operate and apply primary power to the bias and plate supply transformers. To remove plate and bias voltages only, the local plate control S-12 is turned off. To shut down the entire transmitter the local filament switch S-11 is opened.

The d-c overload relay RL-4 has its contacts connected in series with the time delay relay coil. In this manner an overload condition in the plate supply rectifier will open the time delay relay coil circuit and plate power will, therefore, not again come on until the time delay relay has repeated its cycle. This system of connection provides for a delay after each overload so that in case of possible trouble in the circuit the overload relay will not continuously go on and off. Thus, even when operating from the remote control position, the overload relay is automatically reset, but only after a period of approximately one-half minute or possibly less time if the overload was of very short duration.

Taps for 110 or 220 volt operation are provided on the auto transformer T-1, the bias transformer T-3 and the plate transformer T-4. These taps are brought to links on the terminal board and these links are set in the correct position initially, when the transmitter is connected to the line. If, however, the line voltage is consistently more than 5% high, or low, the connections on the primaries of transformers T-3 and T-4 should be changed accordingly. The transformer terminal numbers corresponding to different line voltages are shown on the schematic diagram Fig. 11.

3. DESCRIPTION OF REMOTE CONTROL UNIT RM-10-C

a Mechanical Construction and Arrangement.- The remote control unit furnished as a part of this equipment consists of a small panel which is suitable for mounting on a standard 19 inch relay rack. Removable angle brackets are also furnished so that the unit may be mounted on a table, shelf, wall, etc. Two controls are provided: a toggle switch, located on the right side of the panel provides for remote start and stop control of the transmitter; a jack on the left side of the panel is provided for plugging in a telegraph key. The key and plug are not furnished with this equipment.

A terminal board on the back of the unit provides for all connections to the remote control line. A three wire cable may be used or a standard two wire telephone cable may be employed with the ground connections serving as the return circuit. The Remote Control Unit RM-10-C may be located at a distance as great as 6 miles from the transmitter.

b Circuit Description.- As shown on the schematic wiring diagram Fig. 11, the remote control unit contains only a switch and a key jack. All voltages and

power supplies required are incorporated in Radio Transmitter BC-365-C. Closing the transmitter control switch S-8 operates the control relay RL-1 as described above in paragraph A-2b(8). This applies filament, bias, and plate voltages in the proper time order or, if the local filament switch S-11 is on, applies plate and bias voltages instantaneously. After the transmitter has been started it may be keyed by means of a key inserted into the key jack J-1.

As the key controls only the potential on the grid circuit of a keying tube, there are no dangerously high voltages exposed at the key.

B. INSTRUCTIONS FOR INSTALLATION

1. INITIAL PROCEDURE

a Preferred Site and Layout.

(1) Radio Transmitter BC-365-C.- In selecting the site for the transmitter provision should be made for a short ground connection. Wiring for power and control circuits should be brought in conduit, preferably through the floor under the right side of the transmitter where the wires can go directly to the terminal board. The antenna lead from the top of the transmitter must go to the lead-in insulators without coming in proximity to metal objects. The transmitter mounting dimensions and space required for door clearances are shown on the outline dimensional drawing Fig. 1.

(2) Remote Control Unit RM-10-C.- The remote control unit may be installed wherever required for performing its function. It may be located at a distance as great as 6 miles from the transmitter. The only consideration is that control wires be available for connection between the control unit and the transmitter.

b Unpacking the Equipment.- After the location for the transmitter is decided from the above instructions, the crated transmitter should then be moved to the proposed location and the packing removed carefully to prevent damage to the equipment. It will be seen that the various components are tied in position to prevent breakage in shipment. All braces and cotton tapes should be removed. The transmitter should then be carefully inspected for parts broken in shipment and various components should be inspected to see that they operate freely without binding. All relays and contactors should be especially checked in this regard.

2. INSTALLATION

a Mounting the Equipment.

(1) Mounting Radio Transmitter BC-365-C.- The mounting dimensions of Radio Transmitter BC-365-C are shown on the outline dimensional drawing Fig. 1. The transmitter should be so located that there is sufficient clearance at each side of the transmitter for the doors to be opened. Sufficient space should also be allowed in front of the transmitter for manipulation of the controls and reading of the meters, etc. After the transmitter is in the correct position a check should be made to see that it is level. It may then be fastened to the floor by means of bolts or lag screws through the casting at each corner.

(2) Mounting Remote Control Unit RM-10-C.- The mounting dimensions of the Remote Control Unit RM-10-C are shown on the outline dimensional drawing

Fig. 2. If a standard 19 inch relay rack is available the remote control unit may be mounted thereon along with any other equipment desired. Alternately, the unit may be mounted, by means of the two brackets supplied, to any table or wall.

b Connection of External Wiring.- With the transmitter in position and all power switches turned off, the power line and control line may be connected to the terminal board. Required connections are shown on the external connections diagram Fig. 3. The size of the power line, connected to terminals 5 and 6, should not be less than No. 10 wire, insulated for 240 volts. The two control wires, connected to terminals 1 and 2, may be of any convenient size, insulated for 125 volts. If a 3-wire cable is used for remote control, the third wire should be fastened to the No. 3 terminal. If a 2-wire cable with ground is used, No. 3 terminal may be left unconnected. A good ground wire, as short as possible, should be secured to the No. 4 terminal. This ground wire should not be less than No. 6 and may preferably be a solid copper ground strap. The antenna lead-in connects to a terminal on the large insulator at the top of the transmitter. This antenna lead-in should be provided with an external grounding switch so that the transmitter may be disconnected and the antenna lead-in grounded when not in use. Alternately, a static drain resistor or choke may be installed.

C. ADJUSTMENT AND OPERATION

1. PREPARATION FOR USE.- Depending upon whether 220 volt or 110 volt supply is to be used, the terminal board links should be set accordingly. Three links are provided and their proper positions are plainly marked. These three links are connected to the proper primary voltage taps on the plate and bias transformers, T-4 and T-3, respectively, and on the auto transformer T-1. Before any power is applied to the equipment these links should be checked to be sure that they are in the proper position.

The line voltage from which the equipment is to be operated should be measured with an external a-c voltmeter. If this voltage is approximately 110 volts or 220 volts, no change is necessary in the equipment. If, however, the line voltage remains continuously at more than approximately 5% higher or lower than the nominal value, it will be necessary to change connections to the bias transformer T-3 and to the plate transformer T-4. The schematic wiring diagram Fig. 11 indicates the terminal numbers on these transformers which correspond to various line voltages.

With all power switches in the OFF position, the vacuum tubes may now be installed in the equipment. The symbol designation of the tube to be installed in each socket is marked on the equipment at each socket.

Power may now be placed on the incoming line and the main line switch S-10 closed. Filament switch S-11 may also be closed and the filament rheostat R-10 should then be adjusted so that the filament voltmeter M-3 reads 10 volts. The vacuum tubes should now be inspected to see that all filaments light up. The green indicating light on the front panel should also light as soon as the filament switch is closed.

A check may now be made of the control and power circuits. During this check the plate leads on the four rectifier tubes, V-8, V-9, V-10 and V-11, should be removed and insulated from the frame and components so that they cannot short-circuit to ground. With the doors closed, the filament switch S-11 and the plate switch S-12 may both be closed. The filaments of the vacuum tubes should light immediately and after approximately 30 seconds delay the plate contactor RL-3

should operate and the red light on the front panel should light. Opening either door of the transmitter should cause the red lamp to go out.

If the above checks are satisfactory the plate leads may be replaced on the rectifier tubes and the equipment is now ready for the initial tune-up procedure.

2. OPERATION

a Precautions and Special Instructions.- Always maintain the vacuum tube filament voltage at the correct value. The filament rheostat R-10 should be adjusted so that the filament voltmeter M-3 reads 10 volts. This adjusts the filament voltage for all vacuum tubes used in the transmitter.

All preliminary tuning and loading adjustments should be made with the TUNE-OPERATE switch S-15 in the down or TUNE position.

When making any adjustment have the test key S-9 in the neutral position. Then press down momentarily to see what action has resulted.

Final operation should be with a power amplifier plate current indicated on M-4 of not over 700 milliamperes. Antenna current indicated on M-5 should be limited to approximately 8 amperes.

b Starting the Equipment.- For remote operation of this equipment the filament and plate local switches S-11 and S-12, respectively, should be left in the OFF position but the main line switch S-10 should be left in the ON position. The transmitter is then started remotely by closing the starting switch S-8 on the panel of Remote Control Unit RM-10-C. This closes the remote control line relay RL-1 which begins the sequence of starting the transmitter through relay RL-2 and the time delay relay RL-5, as described under the paragraph on Control Circuits (par. A-2b(8). The key which is plugged into the key jack J-1 on the remote control unit may then be operated to key the transmitter.

The equipment may be started locally by operating first the filament control switch S-11 and then the plate switch S-12. However, if it is desired to start the equipment with one control, the plate switch may be left in the ON position, and correct starting sequence will then be assured by the time delay relay RL-5.

A green indicator lamp is connected across the primary of the filament transformer and indicates when filament power is on. Across the primary of the plate transformer a red indicator lamp is connected to indicate when plate power is on.

At all times when starting or operating the equipment, the filament voltmeter M-3 should indicate 10 volts. If the reading is not this value, the filament rheostat R-10 should be adjusted in order to correct for line voltage changes.

c Stopping the Equipment.- To stop the equipment when operating locally, the filament switch S-11 may be thrown to the OFF position, or if it is desired to shut off the equipment in the reverse order to starting up, the plate switch may be first thrown to the OFF position and then the filament switch thrown to the OFF position. To stop the equipment when the transmitter is being operated from a remote location, it is only necessary to throw the switch on the remote control panel to the OFF or STOP position. For rapid changes from send to receive, the filament switch may be left in the ON position and the plate switch shut off when receiving.

This may also be accomplished when operating remotely, if the local filament switch of the transmitter is left on. The line control relay will then control the plate contactor RL-3 through relay RL-2 and the remote control relay RL-1.

d Tuning Radio Transmitter BC-365-C.- The first step in operation is to tune the transmitter to the desired frequency. The settings of all tuning dials and tap switches should be set up according to the calibration curves, Fig. 4 to Fig. 9, inclusive, for the operating frequency. With the TUNE-OPERATE switch in the TUNE position and the test key S-9 in the neutral center position, close plate switch S-12. This places plate voltage on all r-f stages, but the stages are inoperative with the test key opened. The plate voltmeter M-7 should indicate approximately 900 volts and since the intermediate amplifier tube V-2 is not biased completely to cutoff, the intermediate amplifier plate current meter M-2 should also give an indication of plate current. All other plate current meters should read zero. The test key S-9 should then be momentarily pressed down and the intermediate amplifier tuning control adjusted for maximum dip on the plate current meter M-2. The test key should be immediately released as soon as this is accomplished. Likewise, the power amplifier tuning control should be adjusted to give maximum dip on the power amplifier plate current meter M-4. It will be noted from Figs. 6 to 8 that resonance may be obtained in the Power Amplifier circuit using any one of several different combinations of capacity and inductance. Initially, it makes no difference which combination (or curve) is selected as long as a good plate current dip is obtained. Later it may be necessary to select a different combination, in order to obtain better antenna coupling conditions. Care should be exercised, however, to assure that the Power Amplifier circuit is not tuned to the 2nd harmonic of the oscillator frequency. This will not occur if the dial setting of the power amplifier tuning control is within 50 or 60 divisions of the dial settings given in the typical calibration curves.

It will be noted that each r-f stage has a range control and a tuning control. If the point of tuning which gives minimum plate current is at one end of the dial scale on the tuning control, it will be necessary to move the range switch to the next position and find the point on the tuning control for this range setting.

The tuning of the antenna circuit depends entirely on the characteristics of the actual antenna at the operating frequency. Since the antenna reactance and resistance are not known, it will be necessary to try several adjustments until the correct tuning and loading are arrived at. The best procedure is to set the antenna coupling switches S-5 and S-16 to the No. 6 positions thus connecting the antenna across all the coupling capacity to obtain minimum coupling. The power amplifier tank capacity and the power amplifier tuning control are then adjusted for minimum power amplifier plate current. The antenna loading control and the antenna tuning controls A and B are then adjusted until the antenna current meter M-5 reads maximum. Since the antenna circuit is probably, initially, very far from resonance, it will be necessary to try several ranges until one is found on which some antenna current results. This can be done in a logical sequence by starting with maximum inductance and gradually decreasing inductance until the correct value is found. Set the coarse ANTENNA LOADING control S-7 on position 5, the fine tap control, designated ANTENNA TUNING B, on position 4 and turn the variometer dial, Tuning A, from 100 to zero. If no indicating of antenna current is found, move the fine tap control to position 3 and again turn the dial from 100 to zero. Repeat for position 2, then position 1. If antenna current is still not found the next step is to place the coarse loading control S-7 on position 4, Tuning B control on tap 4, then turn the TUNING A dial from 100 to zero. Repeat for Tuning B control on taps 3, 2 and 1. By next moving the loading control to position 3, then 2, then 1 and each time trying all four positions of ANTENNA TUNING B

control, the entire tuning range will have been covered. At some tap position some antenna current will be noted. The antenna tuning control A should then be adjusted to the point at which antenna current is a maximum. As the antenna is being tuned to resonance it will be noted that the power amplifier stage may be no longer tuned to maximum dip. This is due to the reflection of resistance and some reactance as the antenna circuit is coupled in. It is therefore necessary to go back and recheck the tuning of the power amplifier and set the control to the point of minimum plate current. For more exact tuning this may be repeated, rechecking the antenna tuning, then rechecking the power amplifier. However, it is not at all important that the antenna circuit be tuned for exactly maximum current and under many conditions may be tuned far to one side of resonance. The power amplifier, though, should always be tuned for maximum plate current dip.

The tune-operate switch S-15 may now be thrown to the OPERATE position, and the test key pressed momentarily while the meter readings of the PA plate current and antenna current are noted. The currents obtained in this position will indicate whether the antenna coupling will have to be increased or decreased. After noting by what proportion the currents will have to be changed, return the TUNE-OPERATE switch to the TUNE position before making further adjustments.

Final operation should be with a power amplifier plate current, indicated on M-4, of NOT OVER 700 MILLIAMPERES. Antenna current, indicated on M-5, should be limited to approximately 8 AMPERES. Operation for short periods of time is satisfactory at a higher antenna current, but this value gives sufficient power output and at the same time limits the antenna circuit losses to a reasonable value.

If the antenna current obtained by the first adjustment was not sufficient, set the ANTENNA COUPLING-COARSE switch S-5 to position 5 to increase coupling, and retune the antenna circuit, then the power amplifier circuit. If the output is still not sufficient, move the ANTENNA COUPLING-COARSE control to position 4 and retune. If necessary the control may be turned to position 3, then position 2, then position 1, retuning the power amplifier at each step. In case the antenna current is still not sufficient, it will be necessary to retune the power amplifier, using a larger value of capacity in the tank circuit. This may be done by turning the plate capacitor switch S-3 to the next higher position, then retuning the power amplifier by means of the range control switch S-4 and the PA tuning dial.

After the ANTENNA COUPLING-COARSE switch S-5 has been adjusted to a setting which gives approximately the desired antenna current, the ANTENNA COUPLING-FINE control switch S-16 should be adjusted to the setting which gives the actual current desired. The tuning of the power amplifier circuit should then be rechecked for minimum plate current.

If the plate current obtained by the first adjustment was too great it will be necessary to retune the power amplifier, using a lesser value of capacity in the tank circuit. This is accomplished by turning the plate capacitor switch S-3 to the next lower position, then retuning the power amplifier by means of the range control and the PA tuning dial. Of course it may have happened that the power amplifier was already tuned up, using the smallest value of plate capacity which would resonate at the operating frequency. If this is true it may be seen by referring to Figs. 6 to 8, inclusive, in which each set of curves is for a different value of plate capacity. For certain antennas, at some frequencies, the above method of adjustment may possibly result in too high a value of plate current, even with the coupling switches set on position 6. If this occurs the antenna tuning should be adjusted until the power amplifier plate current is the correct

value and the power amplifier tuning then adjusted for maximum dip in plate current.

It will be found that there are numerous combinations of tuning control settings which will resonate the power amplifier and antenna circuits. By varying either the power amplifier plate capacity or the antenna coupling capacity, setting the antenna tuning to a point giving approximately correct plate current, then retuning the power amplifier to maximum dip in plate current, a point will be found at which the output power is correct with the minimum power amplifier plate current. Since practically every antenna has slightly different characteristics, the antenna tuning may be entirely different from that shown on Fig. 9. The antenna tuning may be set at any point at which the power amplifier is properly loaded, and, if the power amplifier is then tuned to a dip in plate current, proper operation is assured.

After the transmitter is adjusted, as detailed above, for the approximate desired frequency, it is necessary to check the frequency precisely, with a precision frequency meter or crystal calibrator. The master oscillator tuning control C-7 should be set to give zero beat with the calibrator and then all stages readjusted for correct plate current dip, as shown on the plate current meters, and the correct antenna output, as shown on the antenna ammeter M-5.

After the transmitting equipment has been adjusted and calibrated for the correct operating frequency the setting of all tuning controls should be recorded on a calibration card and this card placed in the tuning chart holder on the front of the transmitter so that at any later date this same frequency may again be obtained with the minimum of tuning-up procedure.

During the tuning-up period, or when operating the equipment, the overload relay may operate due to a momentary overload. In case this happens the key should be raised and not closed until the plate power has come on again.

e To Change Frequency.- Controls are provided on the front panel for tuning to any frequency within the range 150 to 550 kc. If the desired new frequency has already been recorded on a calibration card, it is only necessary to set all controls in accordance with the recorded readings. The transmitter should then be started up and the frequency checked against a precision frequency meter or a crystal calibrator. The frequency should be set to zero beat with the calibrator and all tuning controls checked to insure that they are adjusted correctly to give minimum plate current for each r-f amplifier stage and the required antenna output current. If the desired operating frequency has not previously been set up and recorded on a calibration card it will be necessary to adjust the controls in accordance with the approximate calibration settings given in the Instruction Book, Fig. 4 to Fig. 9, inclusive, and from then on follow the same procedure as was outlined above in describing Operation (par. C-2d).

f Other Functions.- This transmitter has only one type of emission which is continuous wave telegraphy. The power output may be reduced to approximately one-half normal by placing the TUNE-OPERATE switch S-15 in the TUNE position. The output power, of course, may also be decreased by adjusting the capacity coupling between the antenna circuit and the power amplifier tank circuit. However, this value is set when the transmitter is being adjusted and is then fixed during operation.

g Neutralization of Amplifier Stages.- In general, the setting of the neutralizing capacitors C-16 and C-31 will not have to be adjusted. The transmitter has been neutralized at the factory at a frequency of approximately 325 kc and

this setting gives correct neutralization for all operating frequencies. The intermediate amplifier neutralizing capacitor C-16, it will be noted, has been locked with the rotor plates approximately one-half meshed with the stator plates. The power amplifier neutralizing capacitor C-31 has been locked with the rotor plates approximately 30% meshed. In case a locknut has been loosened or a capacitor accidentally turned, it may be reset to the above setting and operation will be satisfactory. However, if it is felt that a readjustment is necessary, the procedure is as follows: disconnect the plate voltage from the intermediate amplifier by disconnecting one of the leads to the plate current milliammeter M-2. Then couple a Cathode Ray Oscilloscope or other r-f voltage indicating device to the tank circuit of the intermediate amplifier. Since the voltage will be low on this stage it will be necessary to use very tight coupling or a very sensitive indicating device. To obtain a good deflection on a Cathode Ray Oscilloscope having a three inch screen, its input lead should be connected directly to the plate lead to the intermediate amplifier tube V-2. Since the transmitter door will have to be closed when power is applied, this lead should enter the transmitter through a perforation in the back panel or some other convenient place. The ground lead of the oscilloscope should be connected to the transmitter frame at some point. With the door closed and the test key pressed, the intermediate amplifier tuning dial is turned to give a maximum deflection on the oscilloscope. The neutralizing capacitor C-16 is then adjusted to some setting and the deflection noted. Several different settings should be tried and the one that gives the least deflection should be used. The locknut should then be tightened so that the capacitor shaft cannot be turned. Disconnect the oscilloscope lead, replace the milliammeter lead, which was removed, to its normal position and proceed to neutralize the power amplifier in a similar fashion. The procedure is the same except that tight coupling is not required. A three inch oscilloscope will give sufficient indication if its insulated lead is twisted around a power amplifier tube plate lead about three times but not directly connected. The antenna should be disconnected so that the transmitter is not loaded when being neutralized. The plate voltage should be removed by disconnecting a lead to the plate milliammeter M-4 and then neutralizing capacitor C-31 is adjusted for minimum deflection. When through neutralizing, disconnect the oscilloscope and replace the lead which was removed from milliammeter M-4.

h Set of Typical Test Data.- It should be realized that the following readings are not exact values for every operating condition. They were taken on one particular transmitter under certain conditions which may not be exactly the conditions encountered in a different service. In general, values of current are higher when operating at the lower frequencies than they are at higher frequencies, due to increased circuit losses at the lower frequencies. The following data was taken with the transmitter operating into an antenna of 8 ohms and 750 mmf. All terminal board links and transformer taps were set for a 220 volt line.

R-F Frequency	150 KC	550 KC
Oscillator Plate Current (Meter M-1)	5.2 MA	4.8 MA
Oscillator Plate Voltage	580 Volts	620 Volts
Intermediate Amplifier Plate Current (Meter M-2)	73 MA	84 MA
Intermediate Amplifier Plate Current with Key Up	30 MA	30 MA
Intermediate Amplifier Plate Voltage	1250 Volts	1270 Volts
Intermediate Amplifier Grid Voltage	20 Volts	20 Volts
Power Amplifier Plate Current (Meter M-4)	680 MA	480 MA

Power Amplifier Plate Voltage (Meter M-7)	1250 Volts	1270 Volts
Power Amplifier Grid Current	100 MA	80 MA
Power Amplifier Grid Voltage	100 Volts	96 Volts
Power Amplifier TUNE-UP Plate Voltage (Meter M-7)	820 Volts	830 Volts
Filament Voltage (Meter M-3)	10 Volts	10 Volts
Antenna Current (Meter M-5)	7.3 Amp.	7.0 Amp.
Bias Supply Voltage (Meter M-6)	90 Volts	88 Volts
Line Input Voltage	220 Volts	220 Volts
Line Input Power	1810 Watts	1680 Watts
Plate Voltage Supply Ripple (RMS)	1.23 %	1.3 %
Bias Voltage Supply Ripple (RMS)	1.89 %	1.89%
Remote Control Voltage	88 Volts	88 Volts
Remote Control Current	30 MA	30 MA
Remote Control Voltage Supply Ripple (RMS)	1.7 %	1.7 %
R-F Carrier Ripple (Peak)	1.36 %	1.5 %
R-F Carrier Total Transient when Keyed 15 wpm	1.43 %	10.0 %
R-F Carrier Total Transient when Keyed 35 wpm	17.7 %	9.5 %
R-F Carrier Total Transient when Keyed 60 wpm	20 %	7.0 %
R-F Carrier Total Transient when Keyed 200 wpm	3.45 %	2.5 %

Calibration of Overload Relay RL-4

Setting marked on relay	0.5	1.0	1.5
Total current flowing through relay and shunt resistor	.42	1.55	2.1

D. MAINTENANCE AND REPAIR

1. ROUTINE MAINTENANCE

a Cleanliness.- Cleanliness is essential to the best operation of this transmitter. The unit may be kept free from dust or dirt by the use of compressed air on the apparatus inside the inclosure or a soft, clean cloth may be used with good results. An oily cloth or waste should never be used, as this causes the collection of dust. Variable capacitors are easily cleaned by means of a compressed air nozzle, or a special brush may be used between the plates to remove dust.

b Relay and Contactor Maintenance.- The contacts on the relays and contactors will not require cleaning, unless they have become pitted or rough from arcing. If there is dust between the contacts, it may be cleaned out with a sheet of paper. In general, sandpaper should not be used as it wears the plating off the contacts, and may leave a rough surface. In case the contacts of the relays become pitted or rough in service they may be carefully smoothed by means of extremely fine sandpaper, or crocus cloth. This will prevent sticking of the contacts which might cause damage to the equipment.

c Checking Meter Readings.- It is usually possible by a visual inspection of the equipment to determine if the operation is normal. The quickest indication is

generally by means of comparison with the meter readings which indicate normal plate current and output from the transmitter. Care should be taken that the filament voltage is maintained at the correct operating level. All filament voltages will be correct if the filament voltmeter on the front panel reads 10 volts and this value should be maintained by means of the filament rheostat R-10.

d Vacuum Tube Inspection.- A simple indication of the operation of the transmitter is the color of the vacuum tubes. During normal, full load operating conditions there should be no color indicated on the plate of any Tube VT-143 (type 805 vacuum tube). An indication of a gassy tube is that after a short time of operation the tube plate current will start to rise very rapidly. If the filament of a tube has lost its emission the plate current will be lower than normal. If there is any question regarding the emission of a tube, a quick test may be made by replacing with a new tube, or an external set-up may be used for testing the emission of the tube.

The mercury vapor rectifier tubes V-8, V-9, V-10 and V-11 operate with a distinctive bluish color. This is a characteristic of mercury vapor rectifier tubes, and the intensity of the bluish color will vary with the current drawn from the rectifier. If this glow changes decidedly in its color, or if the tube envelope becomes blackened, it is usually an indication that the tube should be replaced.

e Lubrication.- There are very few parts in this equipment which require lubrication. However, the r-f switch shaft bushings will work more freely if a drop of light machine oil is placed on each bushing at intervals of approximately once a month. Care should be taken that the oil does not spread onto other parts of the switch. Excess oil should be wiped off immediately.

f Checking Fuses.- In case the power does not come on when the proper switch is thrown, the incoming power line should be checked to be sure that voltage is available. If the line voltage is available, the fuses should be checked. A supply of each type of fuse should be kept on hand in the supply box to replace any that are blown out in service. This will include the miniature cartridge type fuses and also replaceable links for the large cartridge fuses.

2. LIST OF POSSIBLE TROUBLES AND REMEDIES

	SYMPTON	CAUSE
(1)	No filament voltage. (Indicated on Meter M-3)	No voltage on incoming power line. Main line switch S-10 not closed. Fuse F-2 or F-3 blown. Filament switch S-11 not closed. (if operating from LOCAL position) Remote ON switch S-8 not closed. Remote control relay RL-1 has not operated (see sympton 6) Dirty contact on Remote Control Relay RL-1 Top 110/220 V. link not connected.
(2)	Filament ON green lamp does not light.	No filament voltage. (See symptom 1) Bulb loose in socket. Bulb burned out.

(3)	No plate voltage. (Indicated on Meter M-7)	Time delay relay RL-5 has not closed its contacts. Open door interlock S-13 or S-14. Dirty contact on plate contactor RL-3. Fuse F-4 or F-5 blown. Lower 110/220 V. link not connected. Burned out rectifier tube. Clips removed from caps of rectifier tubes.
(4)	Plate ON red lamp does not light.	No plate voltage (See Symptom 3) Bulb loose in socket. Bulb burned out.
(5)	No bias voltage. (Indicated on Meter M-6)	Plate contactor has not operated (See Symptom 3) Dirty contact on plate contactor. Fuse F-6 or F-7 blown. Middle 110/220 V. link not connected.
(6)	Remote Control Relay RL-1 will not operate.	Fuse F-1 blown. Remote Control line not connected to transmitter. Remote Control line is too high resistance. Rectox aging tap on autotransformer T-1 not connected. Remote Control Unit RM-10-C not connected to line.
(7)	Closing test key does not key the transmitter	Clip removed from cap of keyer tube. Keyer tube burned out.
(8)	Transmitter will key from test key but not from Remote Control Unit RM-10-C.	Key plug not properly inserted in the jack. Remote Control line is open-circuited or high resistance.
(9)	No r-f in antenna. (Indicated on Meter M-5)	Intermediate amplifier not tuned to resonance. Lack of plate voltage. Incorrect tuning of the antenna system. Open antenna lead.

E. APPENDIX

1. PARTS LIST

a. Radio Transmitter BC-365-C

SYMBOL	NAME OR FUNCTION	DESCRIPTION	MANUFACTURER	IDENTIFICATION	NOTES
C-1	Capacitor, Osc. Fil. Bypass	Mica, .04 Mfd., 600 V. Working	Solar	XMW-.6-14	
C-2	Capacitor, Osc. Fil. Bypass	Same as C-1			
C-3	Capacitor, Osc. Plate Meter Bypass	Mica, .01 Mfd., 500 V. Working	Solar	MHEW-1049	
C-4	Capacitor, Osc. Plate Bypass	Mica, .01 Mfd., 1200 V. Working	Solar	XMW-1.2-11	
C-5	Capacitor, Osc. Grid Coupling	Mica, .0004 Mfd., ±5%, 600 V. Working	Solar	XMDW-.6-34-5	
C-6	Capacitor, Osc. Padding	Variable, 440 Mmf., .050" Air Gap, with rotor locking device	Cardwell	XO-440-PS with ARL rotor lock	
C-7	Capacitor, Osc. Tuning	Variable, 500 Mmf., .050" Air Gap	Cardwell	XO-500-PS	
C-8	Capacitor, Osc. Tank Compensating	Ceramicon, .000150 Mfd., ±5%, 500 V. Working	Erie	N-680, M-150±5%	
C-9	Capacitor, Osc. Tank	Mica, .001 Mfd., ±5%, 600 V. Working	Solar	XMDW-.6-21-5	
C-10	Capacitor, Osc. Tank	Same as C-9			
C-11	Capacitor, Osc. Tank	Same as C-9			
C-12	Capacitor, Osc. Tank	Same as C-9			
C-13	Capacitor, Osc. Tank	Mica, .002 Mfd., ±5%, 600 V. Working	Solar	XMDW-.6-22-5	
C-14	Capacitor, Osc. Tank	Same as C-13			
C-15	Capacitor, Osc. Tank	Same as C-13			
C-16	Capacitor, IA Neutralizing	Variable, 7 Mmf., with screw driver slot in stub shaft	Cardwell	ZS-7-SS	
C-17	Capacitor, IA Fil. Bypass	Mica, .02 Mfd., 600 V. Working	Solar	XMW-.6-12	
C-18	Capacitor, IA Fil. Bypass	Same as C-17			
C-19	Capacitor, Osc. Compensating	Variable, 165 Mmf., .050" Air Gap with rotor locking device	Cardwell	MO-165-BS with ARL lock	
C-20	Capacitor, IA Pl. Meter Bypass	Same as C-3			

PARTS LIST (Continued)

SYMBOL	NAME OR FUNCTION	DESCRIPTION	MANUFACTURER	IDENTIFICATION	NOTES
C-21	Capacitor, IA Plate Tuning	Variable, 440 Mmf., .070" Air Gap	Cardwell	XT-440-PS	
C-22	Capacitor, IA Plate Tank	Mica, .004 Mfd., ±5%, 600 V. Working, Clearance holes	Solar	XMDWA-.6-24-5	
C-23	Capacitor, IA Plate Tank	Same as C-22			
C-24	Capacitor, IA Plate Tank	Same as C-22			
C-25	Capacitor, IA Plate Tank	Same as C-22			
C-26	Capacitor, IA Plate Bypass	Mica, .004 Mfd., 1500 V. Working	Solar	XMW-1.5-24	
C-27	Capacitor, IA Plate Tank	Same as C-22			
C-28	Capacitor, IA Plate Tank	Same as C-22			
C-29	Capacitor, IA Plate Tank	Same as C-22			
C-30	Capacitor, IA Plate Tank	Same as C-22			
C-31	Capacitor, PA Neutralizing	Variable, 16 Mmf., .218" Air Gap, with screwdriver slot	Cardwell	NA-16-NS	
C-32	Capacitor, PA Fil. Bypass	Mica, .01 Mfd., 500 V. Working	Solar	MHW-1049	
C-33	Capacitor, PA Fil. Bypass	Same as C-32			
C-34	Capacitor, PA Fil. Bypass	Same as C-32			
C-35	Capacitor, PA Fil. Bypass	Same as C-32			
C-36	Capacitor, Plate Supply Filter Tuning	Paper, .65 Mfd., ±5%, 2500 V. DC Working, mineral oil filled	Solar	XLUM-2.5-.65-5	
C-37	Capacitor, PA Plate Coupling	Mica, .02 Mfd., 1500 V. Working	Solar	XMW-1.5-12	
C-38	Capacitor, PA Tank	Mica, .003 Mfd., 10 Amp. at 300 Kc., 8000 V. Eff. Test	Solar	XHBW-8-23	
C-39	Capacitor, PA Tank	Same as C-38			

PARTS LIST (Continued)

SYMBOL	NAME OR FUNCTION	DESCRIPTION	MANUFACTURER	IDENTIFICATION	NOTES
C-40	Capacitor, PA Plate Bypass	Same as C-26			
C-41	Capacitor, PA Tank	Same as C-38			
C-42	Capacitor, PA Tank	Mica, .015 Mfd., 8 Amp. at 300 Kc., 2000 V. Eff. Test	Solar	XSBW-2-115	
C-43	Capacitor, PA Plate Meter Bypass	Same as C-3			
C-44	Capacitor, Antenna Coupling	Mica, .03 Mfd., 15 Amp. at 300 Kc., 2000 V. Eff. Test	Solar	XSBW-2-13	
C-45	Capacitor, Antenna Coupling	Same as C-44			
C-46	Capacitor, Antenna Coupling	Mica, .045 Mfd., 11 Amp. at 300 Kc., 1500 V. Eff. Test	Solar	XSBW-1.5-145	
C-47	Capacitor, Keyer Grid Bypass	Same as C-32			
C-48	Capacitor, Rectox Supply Filter	Paper, 1.0 Mfd., 400 V. Working, mineral oil filled	Solar	XDM-4-1	
C-49	Capacitor, Bias Supply Filter	Paper, 4 Mfd., 600 V. Working, mineral oil filled	Solar	XLUMA6-4	
C-50	Capacitor, Bias Voltmeter Bypass	Same as C-3			
C-51	Capacitor, Plate Supply Filter	Paper, 6.0 Mfd., 2000 V. Working, mineral oil filled	Solar	XLSM-20-6	
C-52	Capacitor, Plate Voltmeter Bypass	Same as C-3			
C-53	Capacitor, Plate Supply Filter	Same as C-51			
C-54	Capacitor, IA Fil. Bypass	Paper .5 Mfd., 400 V. Working, mineral oil filled	Solar	XDM-4-.5-10	
C-55	Capacitor, Antenna Coupling	Mica, .0025 Mfd., 2.5 Amp. at 300 Kc., 2000 V. Eff. Test	Solar	XRBW-2-225	
C-56	Capacitor, Antenna Coupling	Mica, .005 Mfd., 4 Amp. at 300 Kc., 2000 V. Eff. Test	Solar	XRBW-2-25	

PARTS LIST (Continued)

SYMBOL	NAME OR FUNCTION	DESCRIPTION	MANUFACTURER	IDENTIFICATION	NOTES
C-57	Capacitor, Antenna Coupling	Mica, .0075 Mfd., 4.5 Amp. at 300 Kc., 1500 V. Eff. Test	Solar	XRBW-1.5-275	
CH-1	Reactor, Rectox Supply Filter	15 H., 60 MA DC	Amertran	F-17111-1	
CH-2	Reactor, Bias Supply Filter	4 H., 350 MA DC	Amertran	F-17109-1	
CH-3	Reactor, Plate Supply Filter	2.7 H., 950 MA DC	Amertran	F-17105-1	
F-1	Fuse, Auto-Transf. Primary	10 Amp. 250 V., Renewable Cartridge	Jefferson Union	#380-010	
F-2	Fuse, Fil. Transf.	3 Amp. 250 V., Renewable Cartridge	Jefferson Union	#380-003	
F-3	Fuse, Fil. Transf.	Same as F-2			
F-4	Fuse, Plate Supply	15 Amp. 250 V., Renewable Cartridge	Jefferson Union	#380-015	
F-5	Fuse, Plate Supply	Same as F-4			
F-6	Fuse, Bias Supply	1 Amp. 250 V.	Littelfuse	3AG #1040	
F-7	Fuse, Bias Supply	Same as F-6			
F-8	Fuse, Fil. & Plate Contactors	Same as F-6			
IL-1	Lamp, Filament Indicating	Mazda, 10 W. 240 V. Candelabra Base S-8 Bulb	G.E.		
	Socket	Flush Receptacle	Bryant	#3851	
	Lens	Green Lens, black nickeled and lacquered ferrule	Bryant	#3850	
IL-2	Lamp, Plate Indicating	Same as IL-1			
	Socket	Same as Socket for IL-1			
	Lens	Red Lens, black nickeled and lacquered ferrule	Bryant	#3850	
L-1	RF Choke, Osc. Grid	250 MH 60 MA	Hammarlund	RFC-250	
L-2	RF Choke, Osc. Plate	Same as L-1			
L-3	Inductance, Osc. Tank		Fed. Tel. Co.	F-17077-2	
L-4	Inductance, Osc. Tank		Fed. Tel. Co.	F-17075-2	
L-5	RF Choke, IA Grid	85 MH 60 MA	Hammarlund	RFC-85	

PARTS LIST (Continued)

SYMBOL	NAME OR FUNCTION	DESCRIPTION	MANUFACTURER	IDENTIFICATION	NOTES
L-6	Inductance, IA Tank (on same form as L-7)		Fed. Tel. Co.	F-17063-12	
L-7	Inductance, IA Tank		Fed. Tel. Co.	Part of L-6	
L-8	RF Choke, IA Plate		Fed. Tel. Co.	F-17034-2	
L-9	RF Choke, PA Grid	Same as L-8			
L-10	RF Choke, PA Plate		Fed. Tel. Co.	F-17033-2	
L-11	Variometer, PA Tank		Fed. Tel. Co.	F-17060-12	
L-12	Variometer, Ant. Loading		Fed. Tel. Co.	F-17011-14	
M-1	Ammeter IS-150, Osc. Plate	0-15 MA DC	Weston	Model 301, Bakelite Case, U.S. Army Spec. 71-515	
M-2	Ammeter IS-7, IA Plate	0-150 MA DC	Weston	Model 301, Bakelite Case, U.S. Army Spec. 71-515	
M-3	Voltmeter IS-130, Filament	0-15 V. AC	Weston	Model 301, Bakelite Case, U.S. Army Spec. 71-515	
M-4	Ammeter IS-10, PA Plate	0-1000 MA DC	Weston	Model 301, Bakelite Case, U.S. Army Spec. 71-515	
M-5	Ammeter IS-78, Antenna	0-10 Amp. RF	Weston	Model 301, Bakelite Case, U.S. Army Spec. 71-515	
M-6	Voltmeter IS-50, Bias Supply	0-150 V. DC	Weston	Model 301, Bakelite Case, U.S. Army Spec. 71-515	
M-7	Voltmeter IS-151, Plate Supply	0-1500 V. DC 200 ohms per volt. (Multiplier for this meter is ref. No. R-11)	Weston	Model 301, Bakelite Case, U.S. Army Spec. 71-515	
R-1	Resistor, Osc. Grid Leak	150,000 Ohm, ±10% 3 Watt, Carbon	Continental	Type 3D	
R-2	Resistor, IA Grid	25 Ohm, ±10% 1 Watt, Carbon	Continental	Type 1D	
R-3	Resistor, PA Grid	50 Ohm, ±10% 5 Watt, Carbon	Continental	Type 5D	

PARTS LIST (Continued)

SYMBOL	NAME OR FUNCTION	DESCRIPTION	MANUFACTURER	IDENTIFICATION	NOTES
R-4	Resistor, PA Grid Suppressor	50 Ohm, Center-tapped, 25 Watt, B Coating, #4 Terminals	I.R.C.	Type NDH	
R-5	Resistor, PA Grid Suppressor	Same as R-4			
R-6	Resistor, Keyer Tube Grid	10,000 Ohm, ±10% 3 Watt, Carbon	Continental	Type 3D	
R-7	Resistor, Keyer Tube Grid	1,000 Ohm, ±10% 1 Watt, Carbon	Continental	Type 1D	
R-8	Resistor, Rectox Supply Bleeder	7,000 Ohm, ±10% 5 Watt, Carbon	Continental	Type 5D	
R-9	Resistor, Overload Relay Shunt	5.5 Ohm, 60 Watt, (Navy Style D, Grade 2, Class I)	Ward Leonard		
R-10	Rheostat, Filament Control	25 Ohm, 300 Watt	Ohmite	#0658	
R-11	Resistor, Voltmeter Multiplier	For 1500 V. Voltmeter IS-151 (M-7)	Weston	Type 5, Box #3	
R-12	Resistor, Bias Supply Bleeder	40 Ohm, 15 Watt (Navy Style F, Grade 2, Class I)	Ward Leonard		
R-13	Resistor, Bias Supply Bleeder	190 Ohm, 60 Watt (Navy Style D, Grade 2, Class I)	Ward Leonard		
R-14	Resistor, Plate Supply Bleeder	2,000 Ohm, 200 Watt (Navy Style A, Grade 2, Class I)	Ward Leonard		
R-15	Resistor, Plate Supply Bleeder	Same as R-14			
R-16	Resistor, Plate Supply Bleeder	Same as R-14			
R-17	Resistor, Plate Supply Bleeder	Same as R-14			
R-18	Resistor, PA Grid	Same as R-3			
R-19	Resistor, Plate Supply Filter Surge	450 Ohm, 70 Watt (Navy Style C, Grade 2, Class I)	Ward Leonard		
RL-1	Relay, Remote Control	One pole, normally open, front connected	Struthers Dunn	CX-2891 Dwg. F-17115-1	
	Coil	70 Volts DC	Struthers Dunn	85A	
	Contacts	220 Volts AC, .25 Amp.			

PARTS LIST (Continued)

SYMBOL	NAME OR FUNCTION	DESCRIPTION	MANUFACTURER	IDENTIFICATION	NOTES
RL-2	Contactor, Filament	Two pole, normally open, front connected	Struthers Dunn	CX-2892 Dwg. F-17121-1	
	Coil	220 Volts 60 Cycle	Struthers Dunn	90	
	Contacts	220 Volts AC, 8 Amp.			
RL-3	Contactor, Plate	Two pole, normally open, front connected	Struthers Dunn	CX-2893 Dwg. F-17123-1	
	Coil	Same as Coil for RL-2			
	Contacts	RH-220 V. AC, 3 Amp. LH-220 V. AC, 15 Amp. Elkonite			
RL-4	Relay, Overload	Adjustable pickup 0.5-2 Amps. DC. Self resetting contacts, normally closed.	W.E. & M. Co.	SC-1, Style #1 096 943 Dwg. F-24259-1	
	Coil		W.E. & M. Co.	Style #1 003 396	
	Contacts	220 V. AC, .25 Amp.			
RL-5	Relay, Time Delay	30 Seconds make, quick release. 220 V. AC, enclosed mercury type, contacts normally open	Adlake	No. 902-72-1 Dwg. F-24207-1	
	Coil	220 V. 60 Cycle			
	Contacts	220 V. AC .25 Amp., mercury to mercury			
S-1	Switch, Osc. Freq. Range	3 Pole, 6 Positions	Daven	F-17036-2-1	
S-2	Switch, IA Freq. Range	2 Pole, 6 Positions	Daven	F-17036-2-2	
S-3	Switch, PA Tank Capacitor	Same as S-1			
S-4	Switch, PA Freq. Range	1 Pole, 3 Positions	Daven	F-17036-2-4	
S-5	Switch, Ant. Coupling-Coarse	Same as S-1			
S-6	Switch, Ant. Tuning B	1 Pole, 4 Positions	Daven	F-17036-2-6	
S-7	Switch, Ant. Loading	1 Pole, 5 Positions	Fed. Tel. Co.	F-17019-2	
S-9	Switch, Test Key	SPDT, L Locking, R Non-Locking	Auto. Elec.	D-321308	
S-10	Switch, Line	2 P, 25A., 250 V., with four back connection studs	G.E.	Type AF-1	

PARTS LIST (Continued)

SYMBOL	NAME OR FUNCTION	DESCRIPTION	MANUFACTURER	IDENTIFICATION	NOTES
S-11	Switch, Local Filament	SPST, 250 V. 30 A.	Trumbull	#2228 S, with black long extension square knob	
S-12	Switch, Local Plate	Same as S-11			
S-13	Switch, Door Interlock	3 A. 250 V. one pole, momentary, closed in depressed position	Cutler-Hammer	#8300	
S-14	Switch, Door Interlock	Same as S-13			
S-15	Switch, Tune-Operate	SPDT, 250 V. 30 A.	Trumbull	#2328 S, with black long extension square knob	
S-16	Switch, Ant. Coupling-Fine	Same as S-1			
T-1	Transformer, Auto- & Rectox Supply	Autotransformer with an additional insulating winding	Amertran	Dwg. F-17113-1	
	Auto. Pri.	110/220 V., 60 Cycles			
	Auto. Sec.	220 V., 60 Cycles			
	Insulated Sec.	100/106/112/118/124 V.			
T-2	Transformer Filament		Amertran	Dwg. F-17101-1	
	Pri.	195 V., 60 Cycles			
	Sec. 1	10.02 V., 3.25 A. CT			
	Sec. 2	10.04 V., 3.25 A. CT			
	Sec. 3	10.16 V., 16.25 A. CT			
	Sec. 4	2.55 V., 10.0 A. CT			
	Sec. 5	5.07 V., 13.5 A. CT			
T-3	Transformer, Bias Supply		Amertran	Dwg. F-17107-1	
	Pri.	240 V., Taps 100, 110, 120, 200, & 220 V., 60 Cycles			
	Sec.	120-0-120 V., 350 MA			
T-4	Transformer, Plate Supply		Amertran	Dwg. F-17103-1	
	Pri.	335 V., Taps 95, 195, 205, 215, 295 & 315 V., 60 Cycles			
	Sec.	1450-0-1450 V., 950 MA			

PARTS LIST (Continued)

SYMBOL	NAME OR FUNCTION	DESCRIPTION	MANUFACTURER	IDENTIFICATION	NOTES
V-1	Tube VT-143, Oscillator	Vacuum	United	U.S. Army Spec. 71-1243	
V-2	Tube VT-143, IA	Same as V-1			
V-3	Tube VT-143, PA	Same as V-1			
V-4	Tube VT-143, PA	Same as V-1			
V-5	Tube VT-143, PA	Same as V-1			
V-6	Tube VT-143, PA	Same as V-1			
V-7	Tube VT-143, Keyer	Same as V-1			
V-8	Tube VT-46-A, Bias Supply	Mercury Vapor Rect.	United	U.S. Army Spec. 71-746	
V-9	Tube VT-46-A, Bias Supply	Same as V-8			
V-10	Tube VT-42-A, Plate Supply	Mercury Vapor Rect.	Fed. Tel. Co.	U.S. Army Spec. 71-742	
V-11	Tube VT-42-A, Plate Supply	Same as V-10			
For V-8 and V-9	Tube Socket, Bias Tube Sockets	4 pin ceramic, wafer	Johnson	Type 224	
For V-1 to V-7 inc. V-10 and V-11	Tube Socket, for 805 and F-353-A tubes	4 pin ceramic, base, 50 Watt	Johnson	Type 211, white	
Z-1	Rectifier, Control Voltage	Copper Oxide, 77.5 V. 60 MA. Two Stacks, each stack with brackets	G.E.	Model 6RC3B134 (Each Stack) Dwg. F-17051-1	

PARTS LIST (Continued)

b. Remote Control Unit RM-10-C

SYMBOL	NAME OR FUNCTION	DESCRIPTION	MANUFACTURER	IDENTIFICATION	NOTES
J-1	Jack, Remote Key	Open Circuit Type	Yaxley	Junior, Type 701	
S-8	Switch, Remote OFF-ON	SPST, 3 A. 125 V. Toggle	H. & H.	F-10675-12-1	
	Designation Plate, for Switch S-8	OFF-ON	H. & H.	F-10675-12E-Fig. 2	

c. List of Manufacturers' Names and Addresses

SYMBOL	NAME	ADDRESS
Adlake	The Adams and Westlake Company	Elkhart, Ind.
Amertran	American Transformer Company	Newark, N. J.
Auto. Elec.	American Automatic Elec. Sales Company	Chicago, Ill.
Bryant	Bryant Electric Company	Bridgeport, Conn.
Cardwell	The Allen D. Cardwell Mfg. Corp.	Brooklyn, N. Y.
Continental	Continental Carbon, Inc.	Cleveland, Ohio
Cutler-Hammer	Cutler-Hammer, Inc.	Milwaukee, Wis.
Daven	The Daven Company	Newark, N. J.
Erie	Erie Resistor Corporation	Erie, Penna.
Fed. Tel. Co.	Federal Telegraph Company	Newark, N. J.
G.E.	General Electric Company	Schenectady, N. Y.
Hammarlund	Hammarlund Mfg. Company	New York, N. Y.
H.&H.	Arrow-Hart & Hegeman Elec. Company	Hartford, Conn.
I.R.C.	International Resistance Company	Philadelphia, Penna.
Jefferson Union	Jefferson Union Company	Bellwood, Ill.
Johnson	E. F. Johnson Company	Waseca, Minn.
Littelfuse	Littelfuse Laboratories	Chicago, Ill.
Ohmite	Ohmite Mfg. Company	Chicago, Ill.
Solar	Solar Mfg. Corp.	Bayonne, N. J.
Struthers Dunn	Struthers Dunn, Inc.	Philadelphia, Penna.
Trumbull	The Trumbull Electric Mfg. Company	Plainville, Conn.
United	United Electronics Company	Newark, N. J.
Ward Leonard	Ward Leonard Mfg. Corp.	Mt. Vernon, N. Y.
W.E.&M. Co.	Westinghouse Elec. & Mfg. Co.	Pittsburgh, Penna.
Weston	Weston Electrical Instrument Corp.	Newark, N. J.
Yaxley	P. R. Mallory & Company	Indianapolis, Ind.

2. SPARE PARTS LIST

QUAN.	SYMBOL	IDENTIFICATION
1		Spare Parts Box, Fed. Tel. Co. Drawing F-17136-12
1	C-1, C-2	Fixed capacitor, mica, .04 mfd., 600 V. Working, Solar XMW-.6-14
5	C-3, C-20, C-32, C-33, C-34 C-35, C-43, C-47, C-50, C-52	Fixed capacitor, mica, .01 mfd., 500 V. Working, Solar MHW-1049
1	C-4	Fixed capacitor, mica, .01 mfd., 1200 V. Working, Solar XMW-1.2-11
1	C-5	Fixed capacitor, mica, .0004 mfd., 600 V. Working, Solar XMDW-.6-34-5
1	C-8	Fixed capacitor, ceramic, .000150 mfd., 500 V. Working, Erie N-680, M-150 ±5%
2	C-9, C-10, C-11, C-12	Fixed capacitor, mica, .001 mfd., 600 V. Working, Solar XMDW-.6-21-5
2	C-13, C-14, C-15	Fixed capacitor, mica, .002 mfd., 600 V. Working, Solar XMDW-.6-22-5
1	C-17, C-18	Fixed capacitor, mica, .02 mfd., 600 V. Working, Solar XMW-.6-12
4	C-22, C-23, C-24, C-25, C-27, C-28, C-29, C-30	Fixed capacitor, mica, .004 mfd., 600 V. Working, Solar XMDWA-.6-24-5
1	C-26, C-40	Fixed capacitor, mica, .004 mfd., 1500 V. Working, Solar XMW-1.5-24
1	C-36	Fixed capacitor, paper, .65 mfd., 2500 V. Working, Solar XLUM-2.5-.65-5
1	C-37	Fixed capacitor, mica, .02 mfd., 1500 V. Working, Solar XMW-1.5-12
2	C-38, C-39, C-41	Fixed capacitor, mica, .003 mfd., 8000 V. Eff. Test, Solar XHBW-8-23
1	C-42	Fixed capacitor, mica, .015 mfd., 2000 V. Eff. Test, Solar XSBW-2-115
1	C-44, C-45	Fixed capacitor, mica, .03 mfd., 2000 V. Eff. Test, Solar XSBW-2-13
1	C-46	Fixed capacitor, mica, .045 mfd., 1500 V. Eff. Test, Solar XSBW-1.5-145

QUAN.	SYMBOL	IDENTIFICATION
1	C-48	Fixed capacitor, paper, 1.0 mfd., 400 V. Working, Solar XDM-4-1
1	C-49	Fixed capacitor, paper, 4. mfd., 600 V. Working, Solar XLUMA6-4
1	C-51, C-53	Fixed capacitor, paper, 6.0 mfd., 2000 V. Working, Solar XLSM-20-6
1	C-54	Fixed capacitor, paper, .5 mfd., 400 V. Working, Solar XDM-4-.5-10
1	C-55	Fixed capacitor, mica, .0025 mfd., 2000 V. Eff. Test, Solar XRBW-2-225
1	C-56	Fixed capacitor, mica, .005 mfd., 2000 V. Eff. Test, Solar XRBW-2-25
1	C-57	Fixed capacitor, mica, .0075 mfd., 1500 V. Eff. Test, Solar XRBW-1.5-275
10	F-1	Fuse link for renewable type fuse, 10 amp., Jefferson Union
20	F-2, F-3	Fuse link for renewable type fuse, 3 amp., Jefferson Union
20	F-4, F-5	Fuse link for renewable type fuse, 15. amp., Jefferson Union
30	F-6, F-7, F-8	Fuse, 1 amp., 250 V., Littlefuse 3 AG, No. 1040
12	IL-1, IL-2	Lamp, S-8 bulb, candelabra base, 10 W, 240 V, General Electric Mazda
1	M-1	Ammeter IS-150, bakelite case, 0-15 MA d-c, Weston 301
1	M-2	Ammeter IS-7, bakelite case, 0-150 MA d-c, Weston 301
1	M-3	Voltmeter IS-130, bakelite case, 0-15 V a-c, Weston 476
1	M-4	Ammeter IS-10, bakelite case, 0-1000 MA d-c, Weston 301
1	M-5	Ammeter IS-78, bakelite case, 0-10 amp. r-f, Weston 425

SPARE PARTS LIST (Continued)

QUAN.	SYMBOL	IDENTIFICATION
1	M-6	Voltmeter IS-50, bakelite case, 0-150 V d-c, Weston 301
1	M-7	Voltmeter IS-151, bakelite case, 0-1500 V d-c, 200 ohms per volt, Weston 301
1	R-1	Resistor, carbon, 3 watts, 150,000 ohms, Continental Carbon 3D
1	R-2	Resistor, carbon, 1 watt, 25 ohms, Continental Carbon 1D
1	R-3, R-18	Resistor, carbon, 5 watts, 50 ohms, Continental Carbon 5D
1	R-4, R-5	Resistor, wirewound, 25 watts, 50 ohms, IRC type NDH
1	R-6	Resistor, carbon, 3 watts, 10,000 ohms, Continental Carbon 3D
1	R-7	Resistor, carbon, 1 watt 1,000 ohms, Continental Carbon 1D
1	R-8	Resistor, carbon, 5 watts, 7,000 ohms, Continental Carbon 5D
1	R-9	Resistor, wirewound, 60 watts, 5.5 ohms, Ward Leonard, Style D, Grade 2, Class I
1	R-11	Resistor, voltmeter multiplier for 1500 V Voltmeter IS-151, Weston type 5 Box #3
1	R-12	Resistor, wirewound, 15 watts, 40 ohms, Ward Leonard, Style F, Grade 2, Class I
1	R-13	Resistor, wirewound, 60 watts, 190 ohms, Ward Leonard, Style D, Grade 2, Class I
2	R-14, R-15, R-16, R-17	Resistor, wirewound, 200 watts, 2000 ohms, Ward Leonard, Style A, Grade 2, Class I
1	R-19	Resistor, wirewound, 70 watts, 450 ohms, Ward Leonard, Style C, Grade 2, Class I
1	RL-1	Relay coil, 70 volts d-c, for a type CX-2891 relay, Struthers Dunn 85A
2 sets	RL-1	Relay contacts, 220 V a-c, 1/4 amp., for a type CX-2891 relay, Struthers Dunn

QUAN.	SYMBOL	IDENTIFICATION
1	RL-2, RL-3	Relay coil, 220 V, 60 cycles, for a type CX-2892 or CX-2893 relay, Struthers Dunn 90
2 sets	RL-2	Relay contacts, 220 V a-c, 8 amp., for a type CX-2892 relay, Struthers Dunn
2 sets	RL-3	Relay contacts, RH: 220 V a-c, 3 amp., LH: 220 V a-c, 15 amp., Elkonite, for a type CX-2893 relay, Struthers Dunn
1	RL-4	Relay coil, 0.5-2 amp. d-c, for a type SC-1 style #1096943 relay, W.E.&M.Co. style #1003396
2 sets	RL-4	Relay contacts, 220 V a-c, 1/4 amp., for a type SC-1 style #1096943 relay, W.E.&M.Co.
1	RL-5	Relay coil, 220 V, 60 cycles, for a No. 902-72-1 time delay relay, Adams and Westlake
2	RL-5	Plunger assembly with mercury to mercury contacts, 220 V a-c, 1/4 amp., for a No. 902-72-1 time delay relay, Adams and Westlake

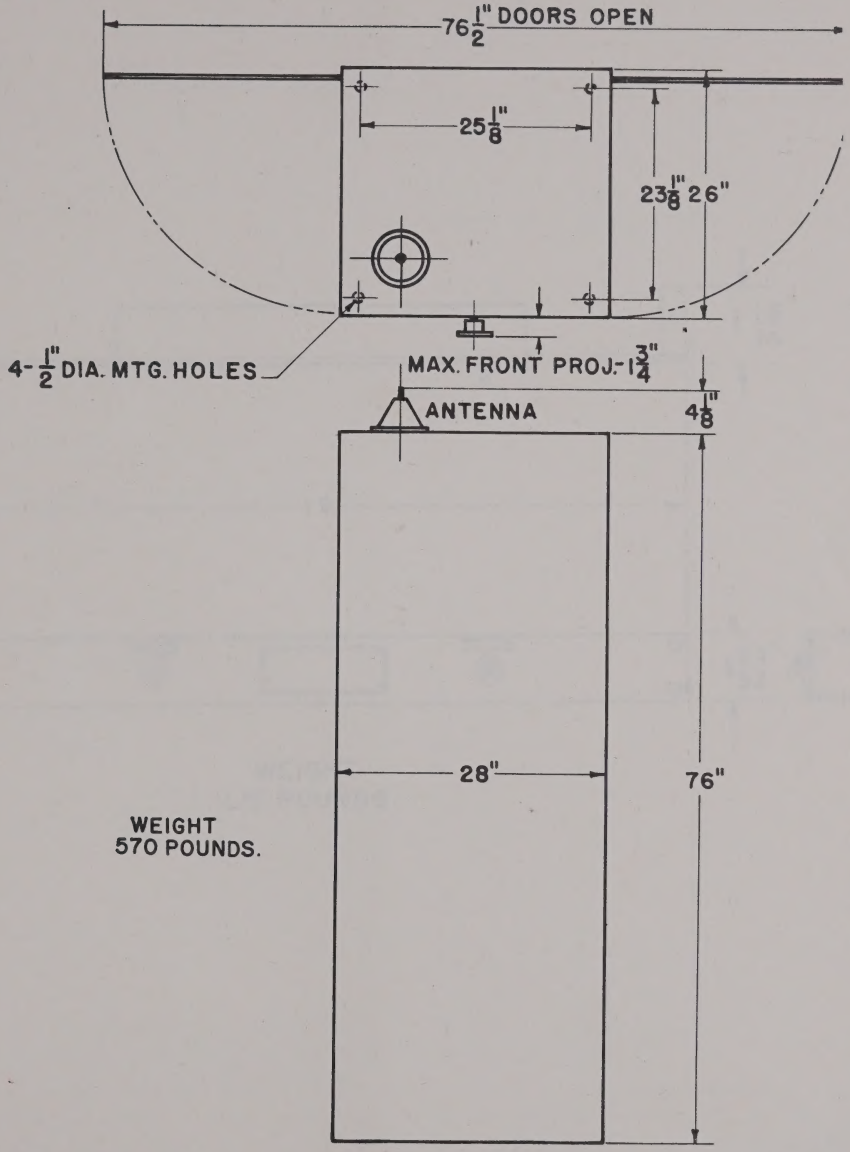
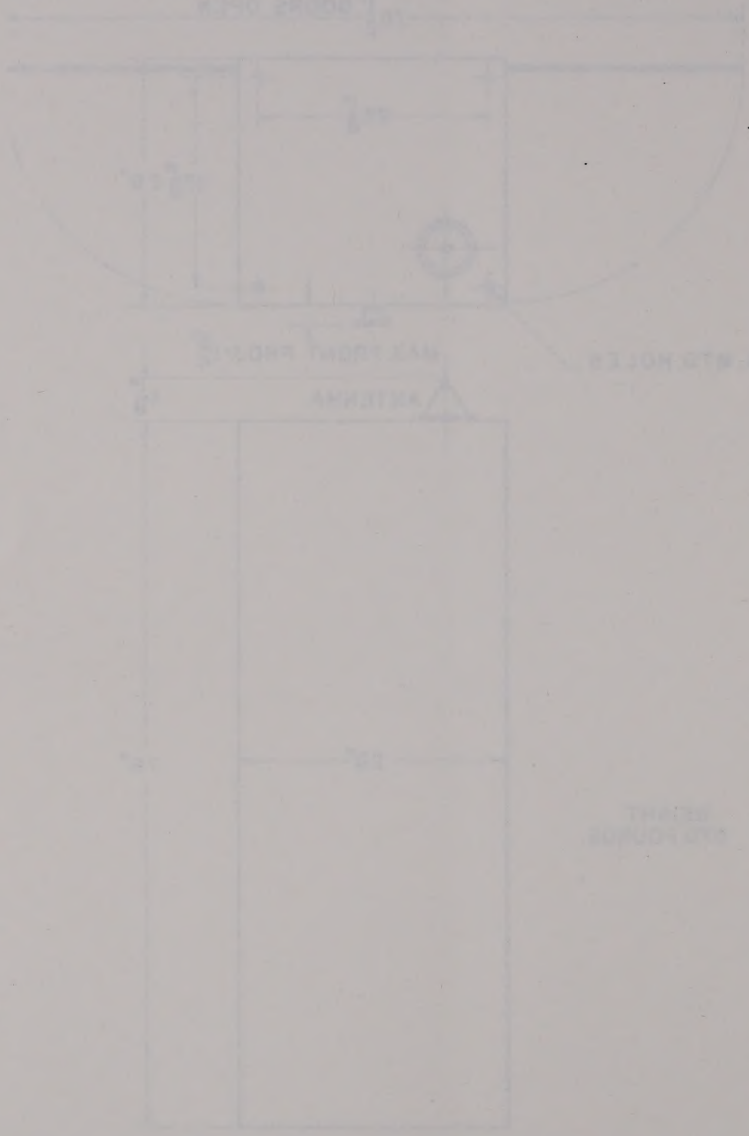
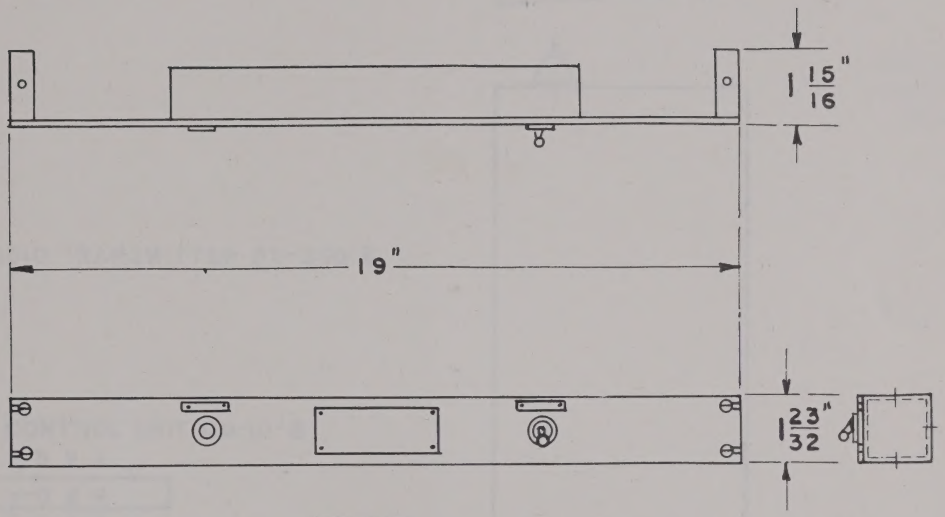


FIG. 1 RADIO TRANSMITTER BC-365-C, OUTLINE DIMENSIONAL DRAWING





WEIGHT
1.15 POUNDS

FIG. 2 REMOTE CONTROL UNIT RM-10-C, OUTLINE DIMENSIONAL DRAWING

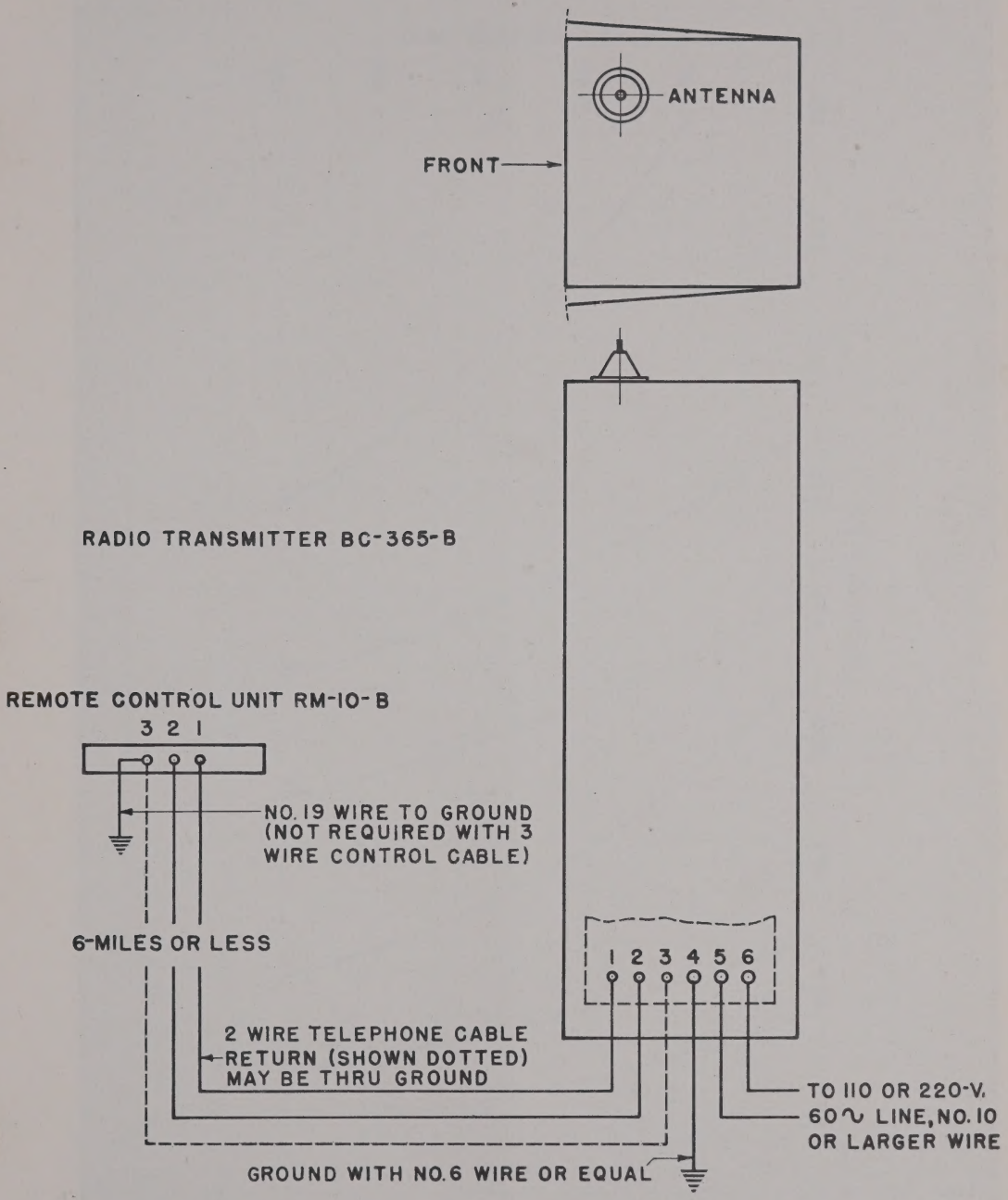


FIG. 3 RADIO TRANSMITTER BC-365-C AND REMOTE CONTROL UNIT RM-10-C, EXTERNAL CONNECTIONS DIAGRAM

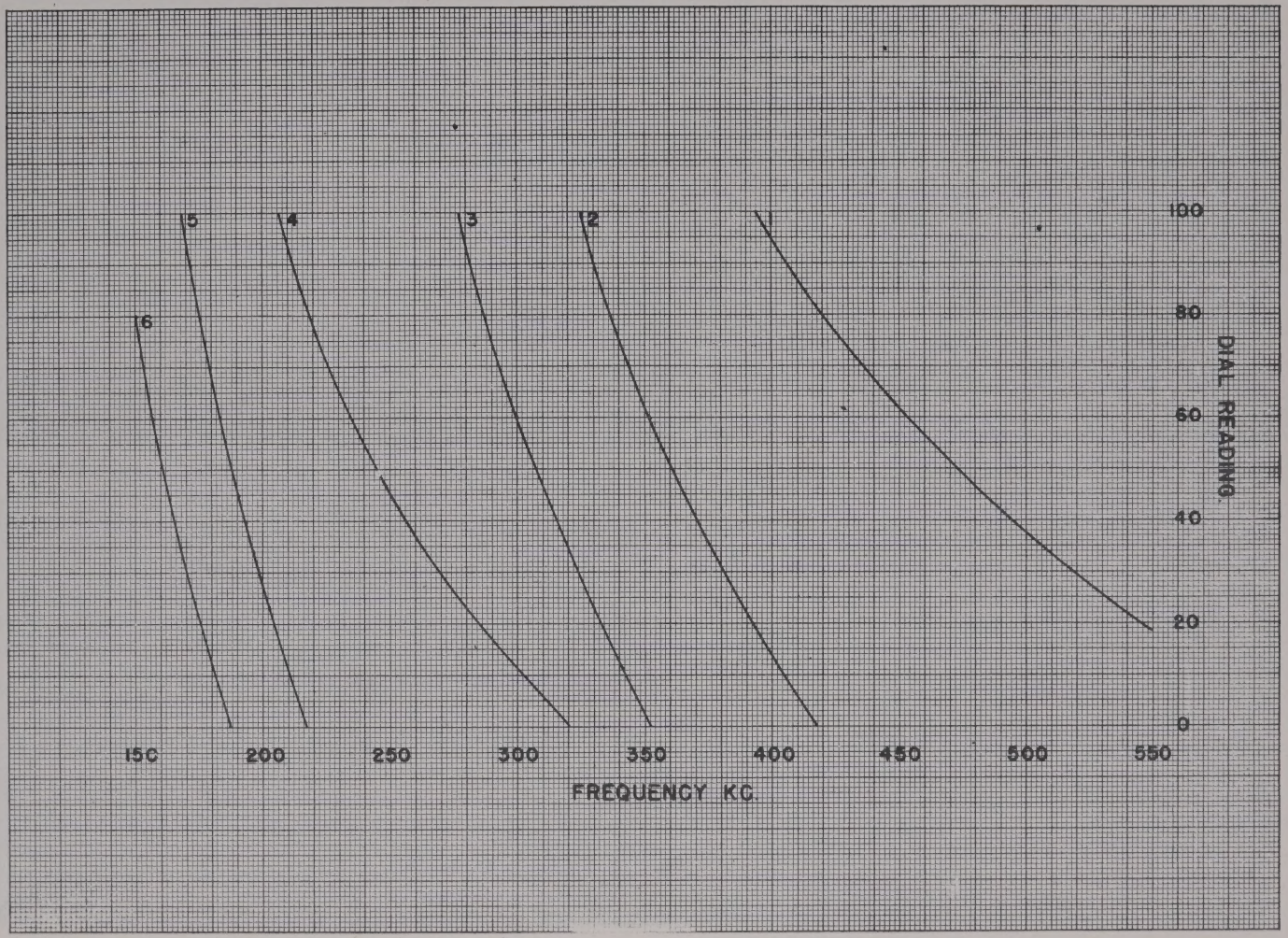


FIG. 4 RADIO TRANSMITTER BC-365-C, TYPICAL CALIBRATION CURVE, MASTER OSCILLATOR

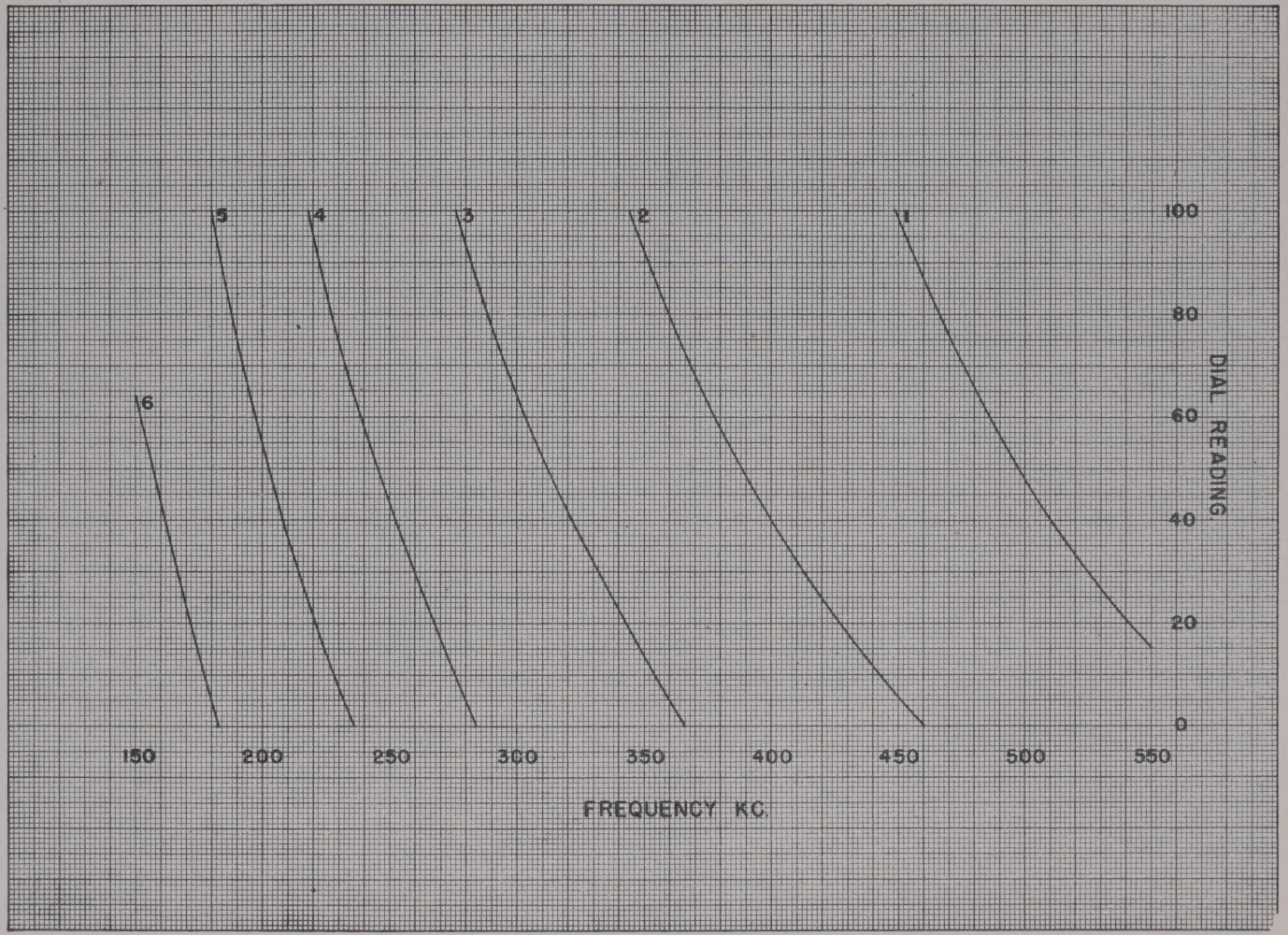


FIG. 5 RADIO TRANSMITTER BC-365-C, TYPICAL CALIBRATION CURVE, INTERMEDIATE AMPLIFIER

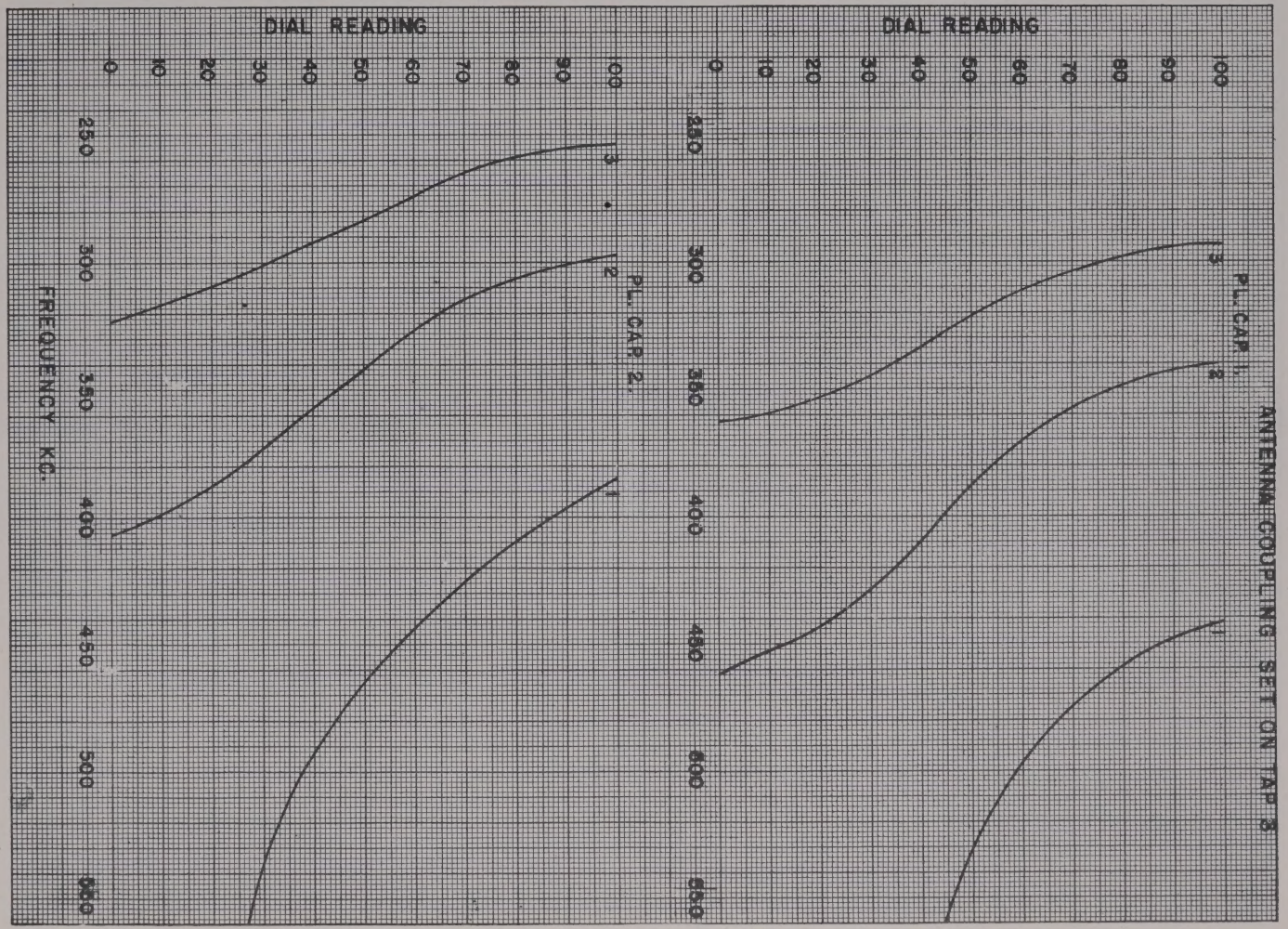


FIG. 6 RADIO TRANSMITTER BC-365-C, TYPICAL CALIBRATION CURVE, POWER AMPLIFIER, RANGES 1 AND 2

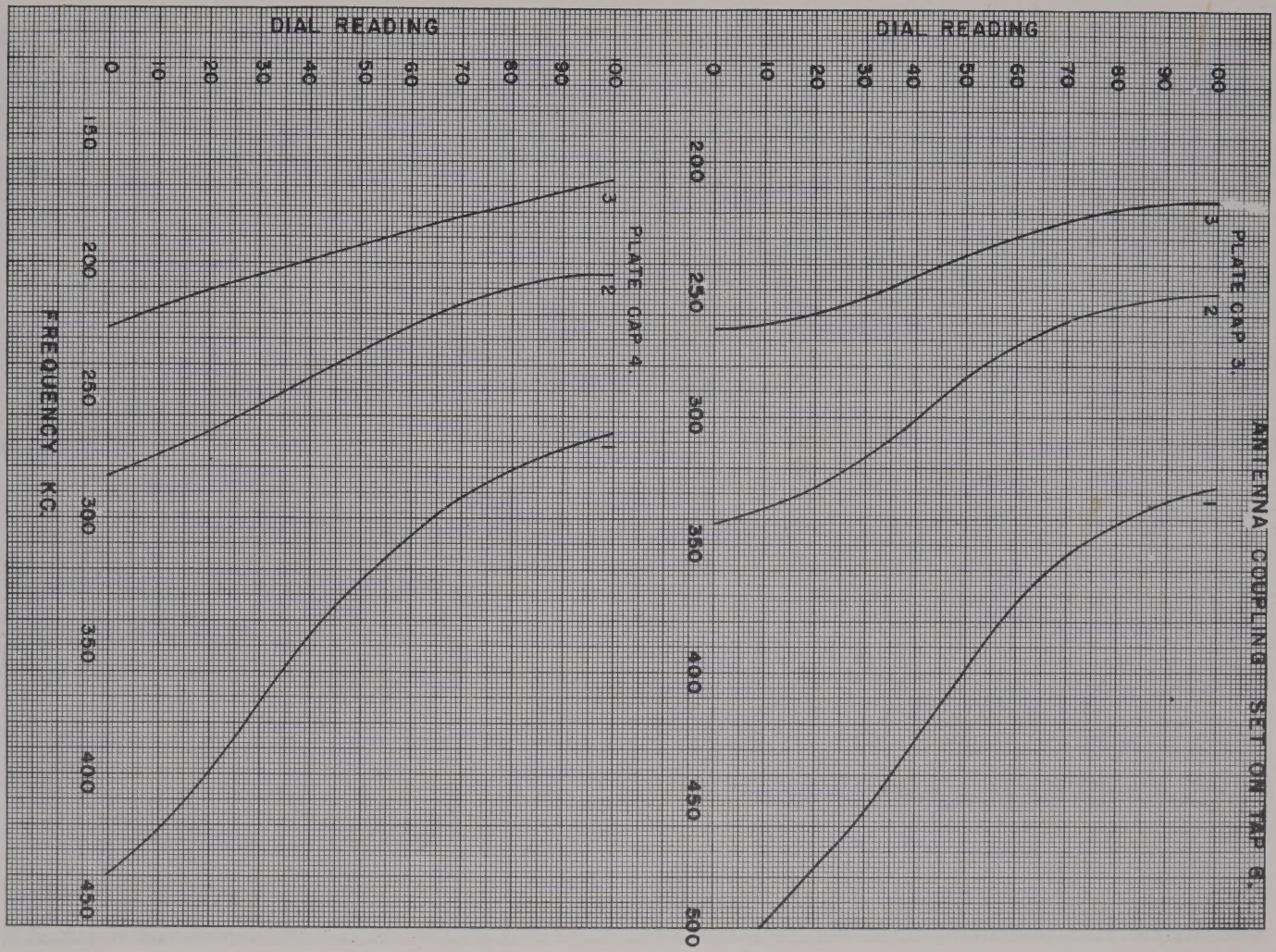


FIG. 7 RADIO TRANSMITTER BC-365-C, TYPICAL CALIBRATION CURVE, POWER AMPLIFIER, RANGES 3 AND 4

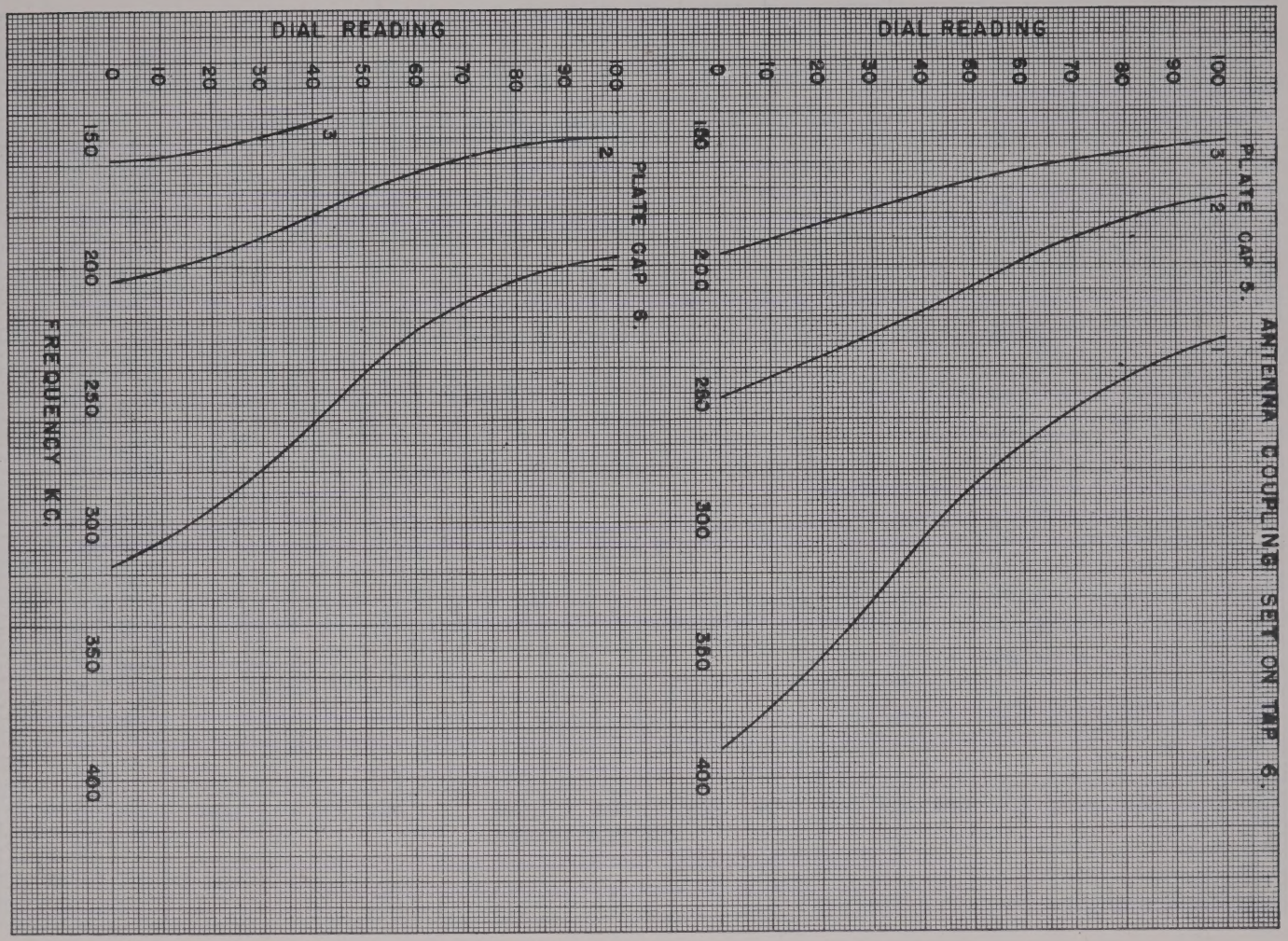


FIG. 8 RADIO TRANSMITTER BC-365-C, TYPICAL CALIBRATION CURVE, POWER AMPLIFIER, RANGES 5 AND 6

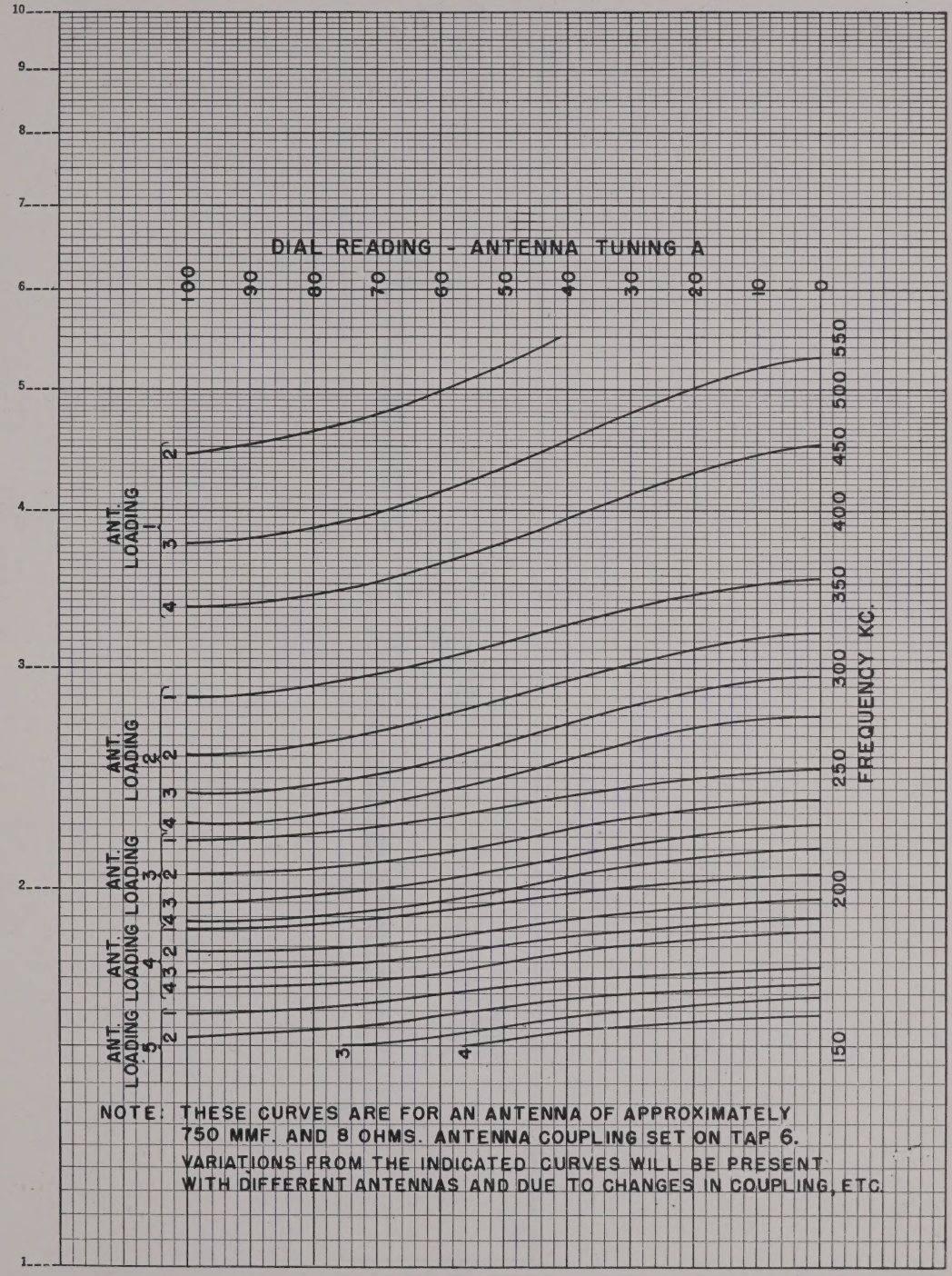


FIG. 9 RADIO TRANSMITTER BC-365-C, TYPICAL CALIBRATION CURVE, ANTENNA CIRCUIT

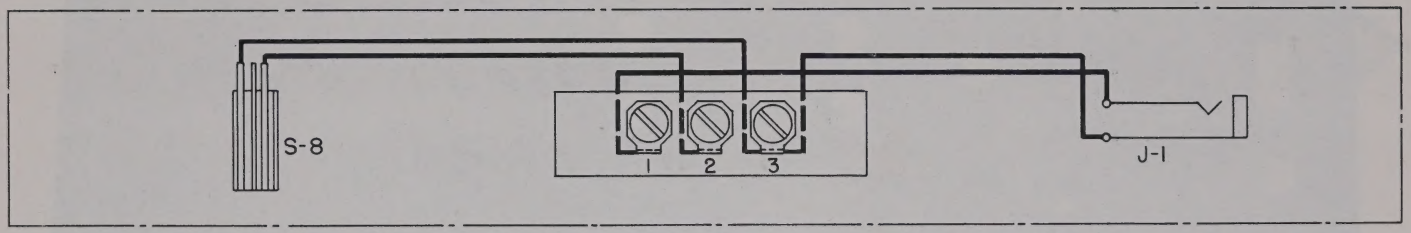


FIG. 13 REMOTE CONTROL UNIT RM-10-C, PRACTICAL WIRING DIAGRAM

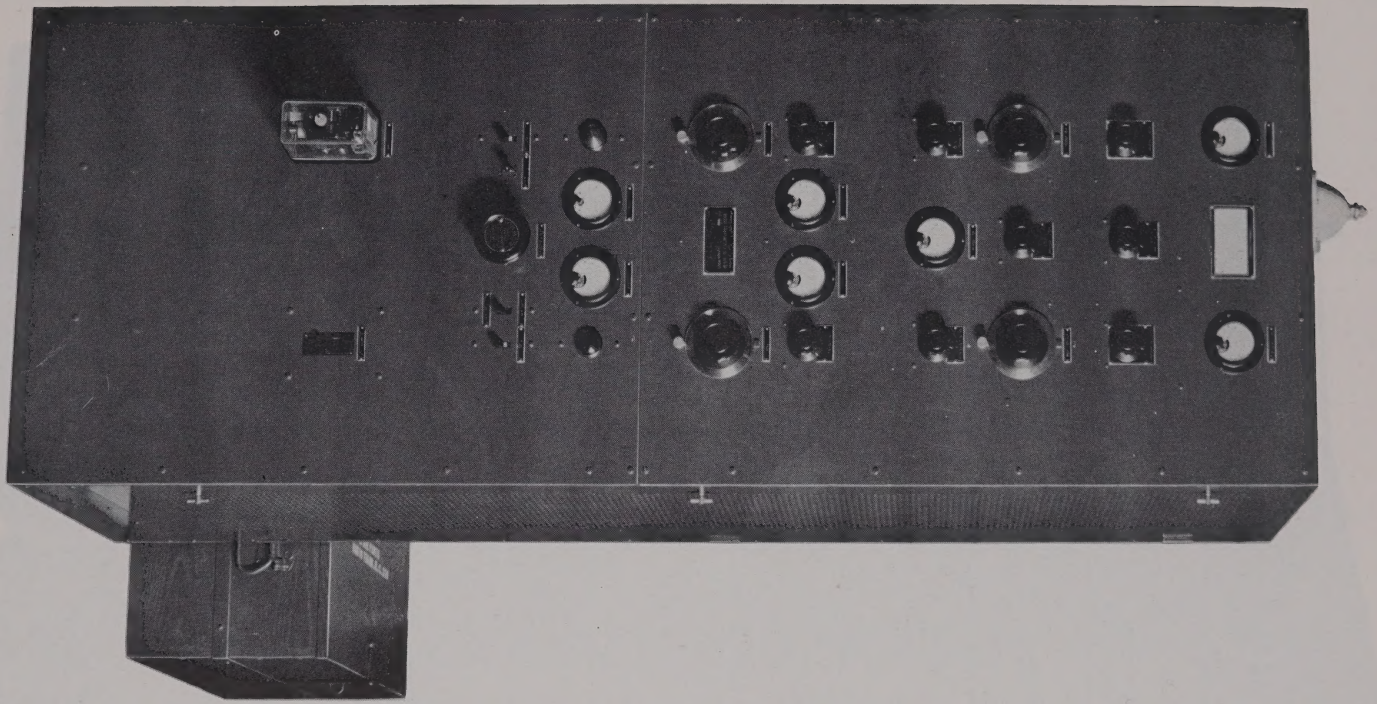


FIG. 14 RADIO TRANSMITTER BC-365-C, FRONT VIEW, AND SPARE PARTS BOX

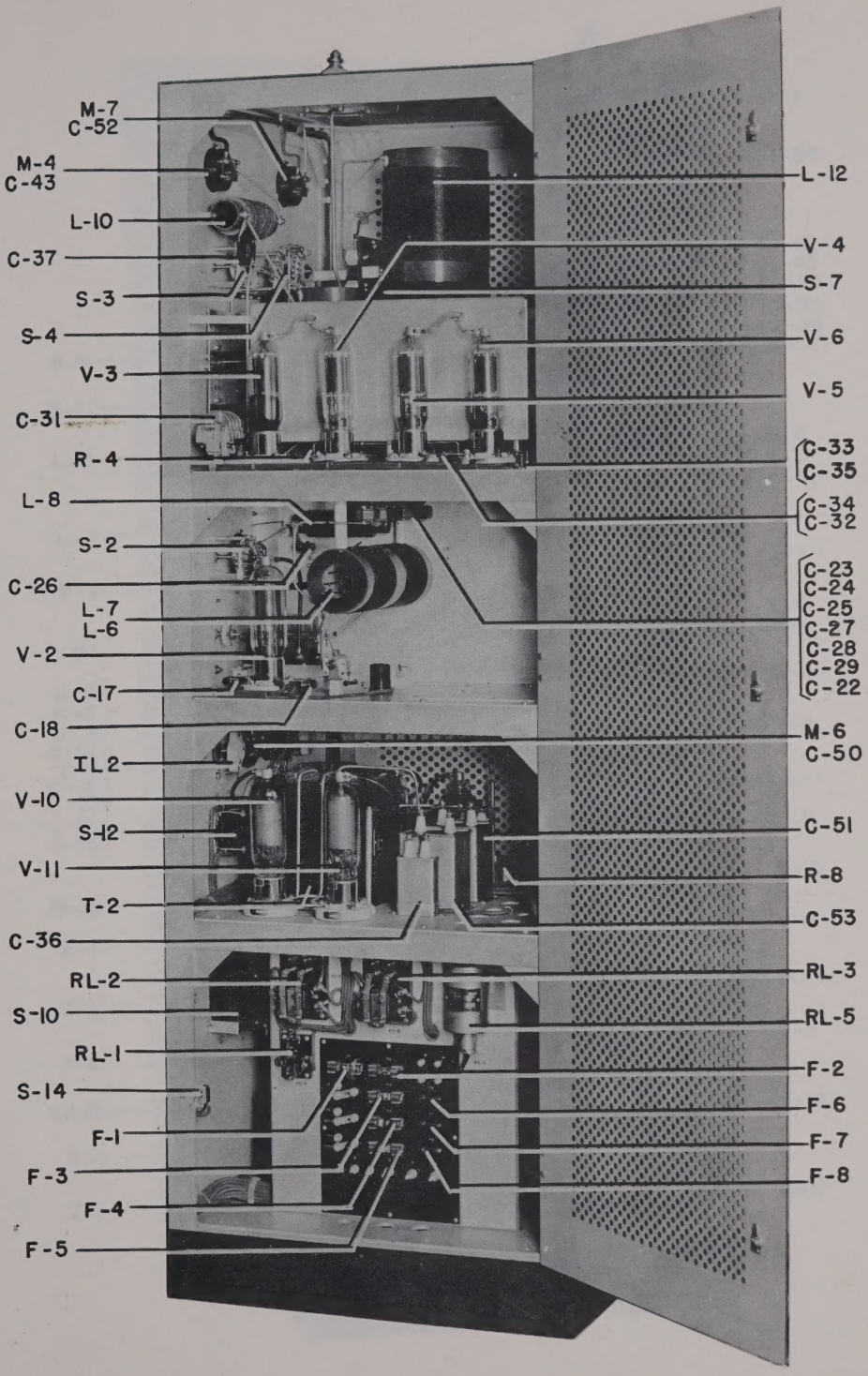


FIG. 15 RADIO TRANSMITTER BC-365-C, RIGHT SIDE VIEW

FIG. 16 RADIO TRANSMITTER BC-365-C, LEFT SIDE VIEW

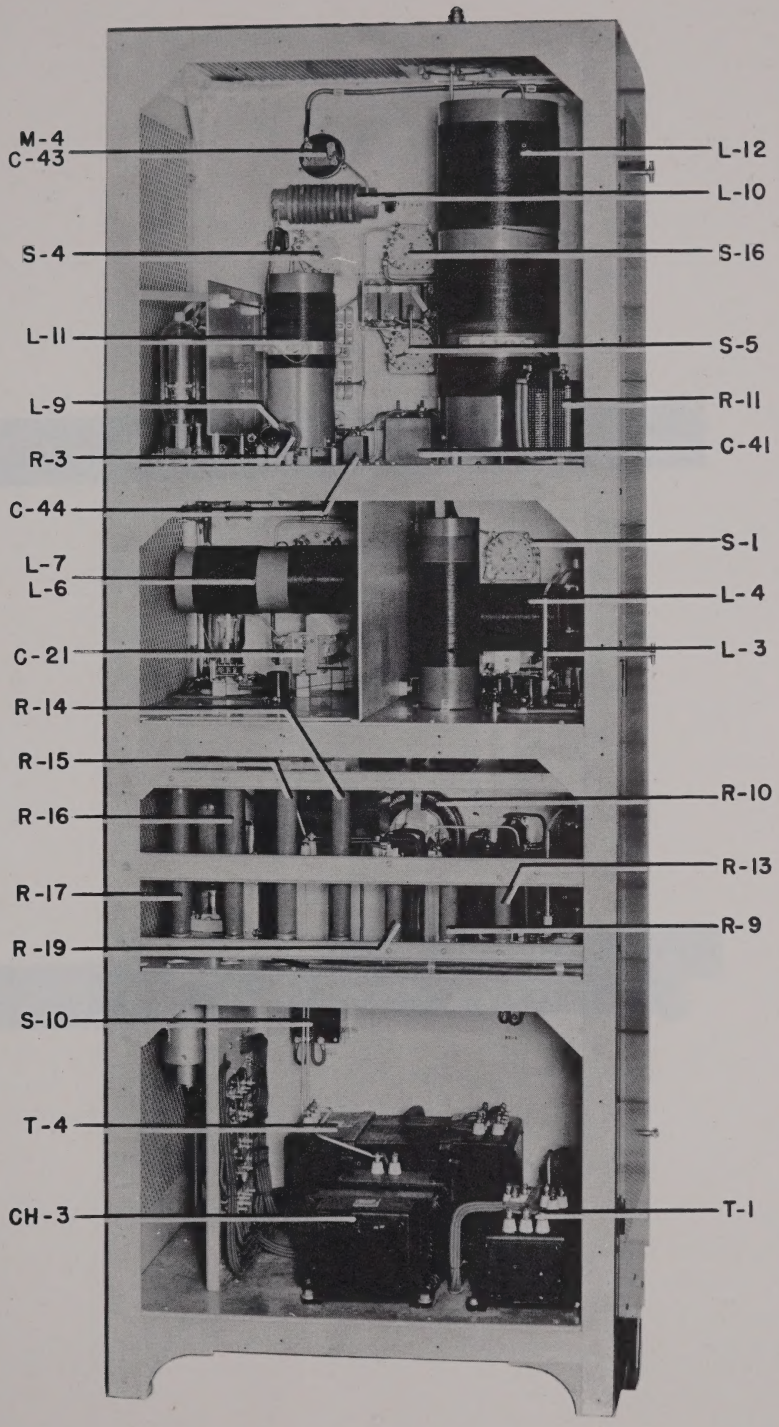
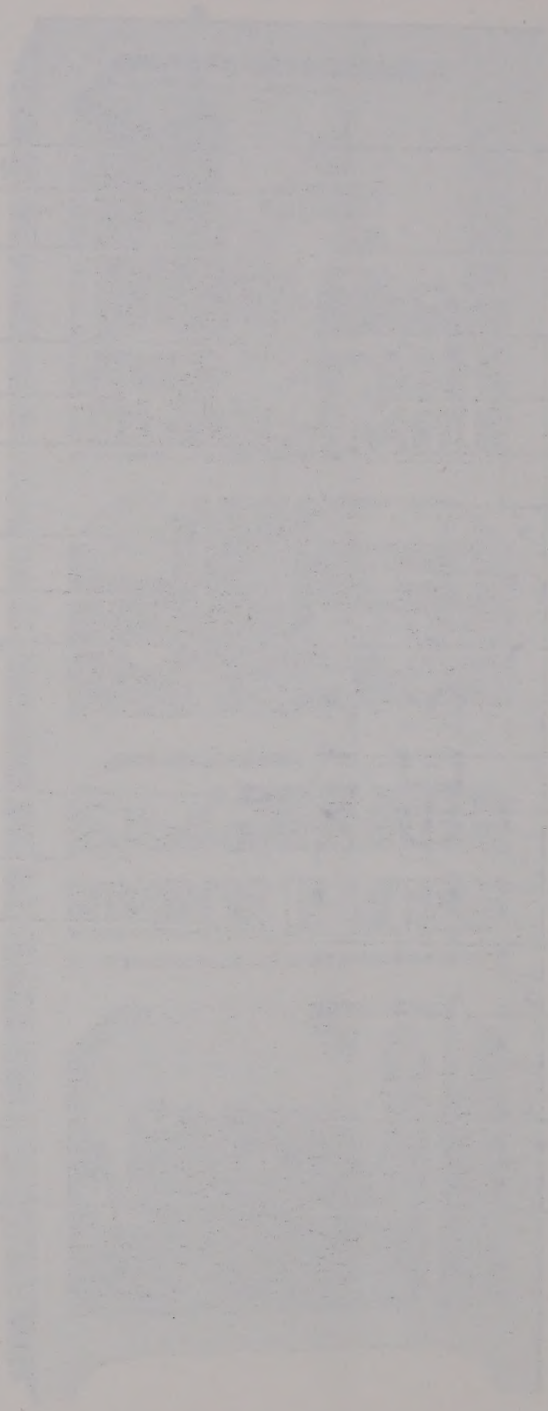


FIG. 17 RADIO TRANSMITTER BC-365-C, REAR VIEW



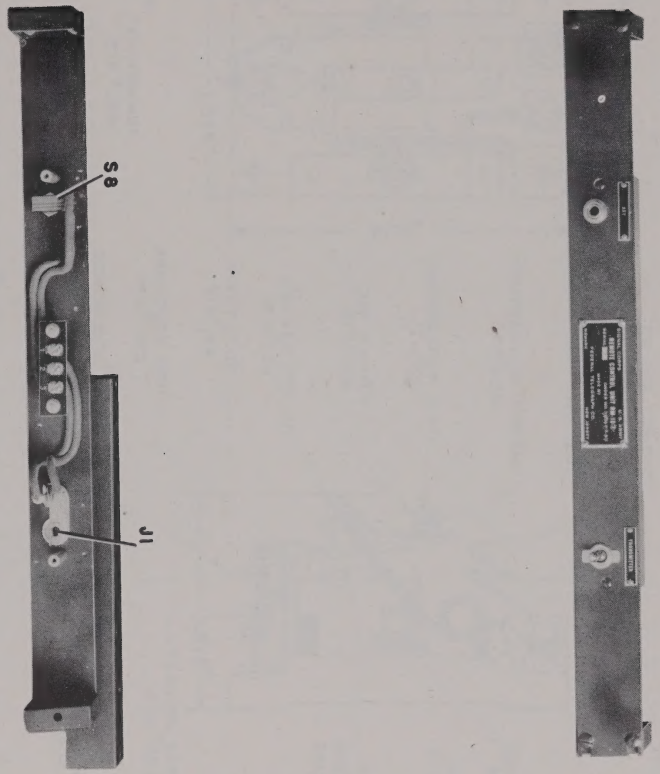
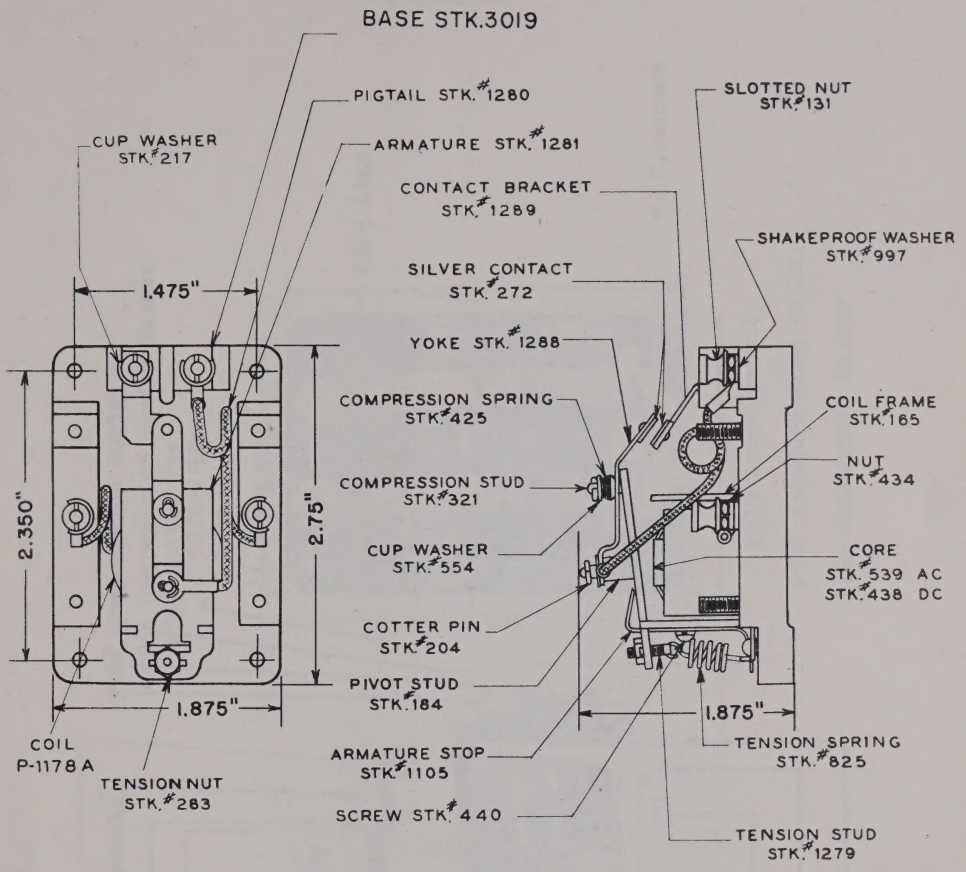


FIG. 18 REMOTE CONTROL UNIT RM-10-C, FRONT VIEW, AND REAR VIEW WITH COVER REMOVED



NOTE

ARMATURE & YOKE ASSEMBLED STK.# 1294.

CONTACT BRACKET " " # 1305.

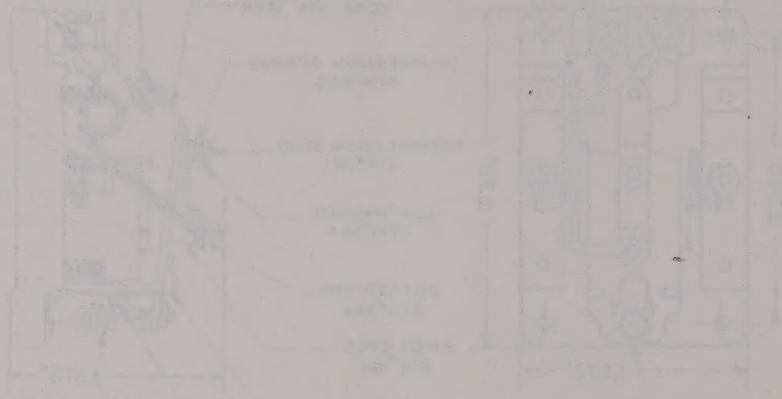
YOKE ASSEMBLED WITH PIGTAIL & CONTACT STK.# 1451.

WHEN ORDERING COIL SPECIFY VOLTAGE AND CYCLE.

ALL FRACTIONAL MACHINE DIMENSIONS TO HAVE TOLERANCES OF ± .010 UNLESS OTHERWISE SPECIFIED.

REVISIONS				STRUTHERS DUNN, INC., PHILA., PA.		
NO.	WAS	DATE	BY		DWG. BY GWL	DATE 5-2-34
					CHK. BY CFS	DATE 9-5-34
					MATERIAL	
				CX2891	SCALE	
					STOCK No.	DWG. No. P-1321

FIG. 19 RADIO TRANSMITTER BC-365-C, REMOTE CONTROL RELAY



PARTS FOR DUNCO RELAYS

TYPE-CX-2892

FIG. 20 RADIO TRANSMITTER BC-365-C, FILAMENT CONTACTOR

Struthers Dunn, Inc.
Philadelphia, Penna.

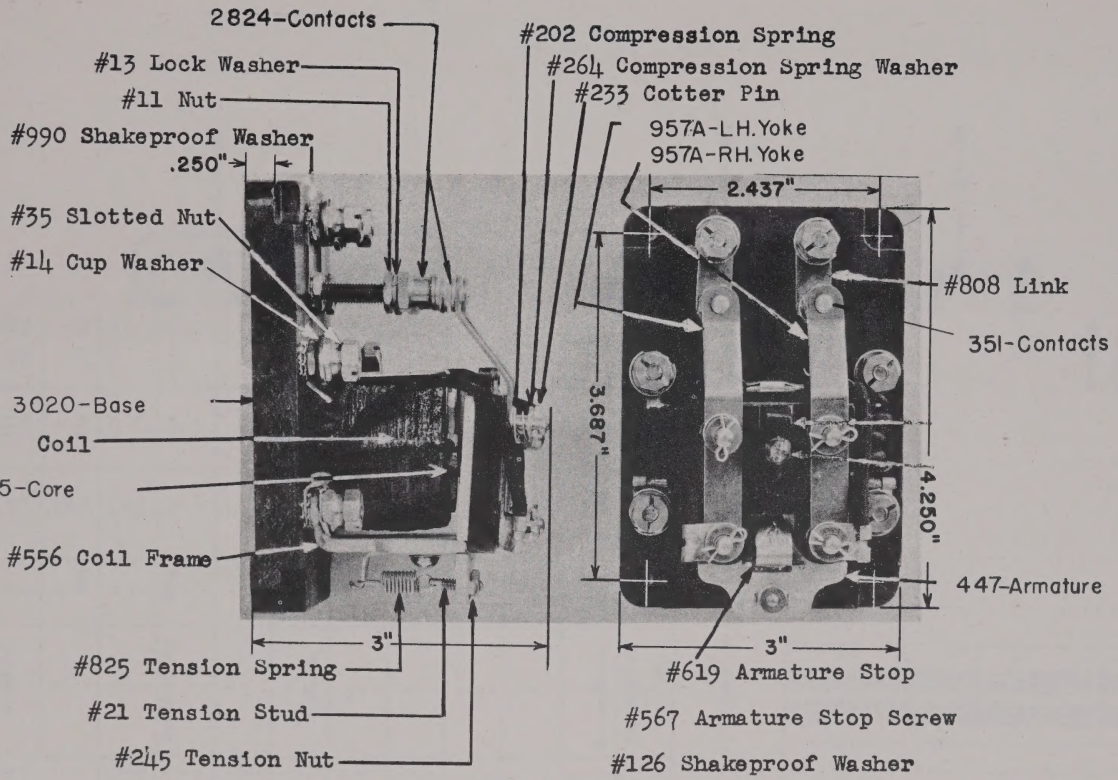


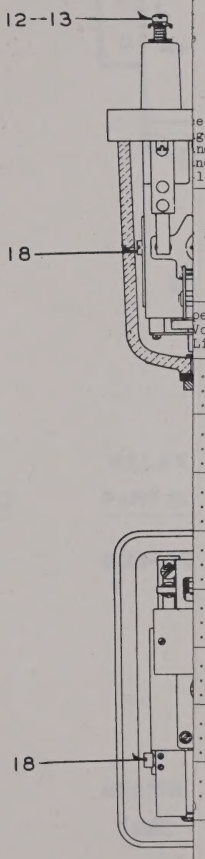
FIG. 21 RADIO TRANSMITTER BC-365-C, PLATE CONTACTOR

Form P189 Pg. 4 Phld. in U.S.A.

Struthers Dunn, Inc.
Philadelphia, Penna.

DESCRIPTION OF PART	Style Number	No. Req
C and SC-1 and DC Types SV-SV-1	1 097 224	1
C Types SV and SV-1	1 097 223	1
	1 097 234	2
lete	1 055 993	1
d DC Type SV.	1 097 225	1
pe SV	1 097 226	1
and DC. Type SV-1	1 097 227	1
pe SV-1	1 097 228	1
SC-1 and DC Types SV and SV-1	1 097 230	1
ypes SV and SV-1	1 097 231	1
for non-latching relays.	1 002 165	1
for latching relays	1 002 164	1
Bracket	704 869	1
Spring	1 002 163	1
r spring	1 002 167	2
	818 876	1
nameplate	1 009 565	2
	821 998	6
	839 114	1
	839 582	6
	837 331	2
	1 009 296	4
	704 861	1
	704 873	1
	1 097 368	1
	321 406	1
	1 098 008	1
	629 939	1
	704 876	1
	704 877	1
	837 815	1
	17 937	1
	704 878	1
ept 4-100 A Range.	1 001 874	1
ge Only	1 097 491	1
nd SC-1 4-100 Amp. Range	837 805	1
nd SC-1 4-100 Amp. Range	837 817	1
l 4-100 Amp. Range	717 064	1

New



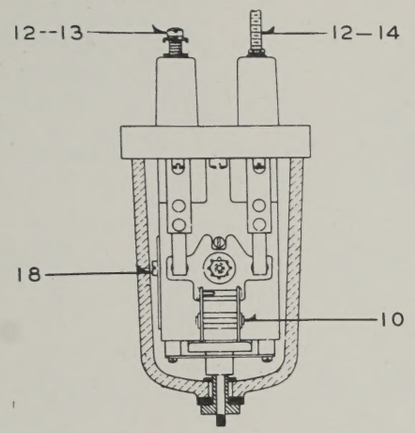
* Not Illustrated
Parts by Style Number and Description included in the Part under which they are indented

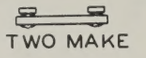
perating Voltage Limits	Rated Voltage	Cycles	Ratio	Latching or Non-Latching	Coil Style Number
....	...	Ac - Dc	High	Non-Latching	1 003 396
....	...	"	"	"	1 003 397
....	...	"	"	"	1 003 398
....	...	"	"	"	1 003 399
....	...	"	"	"	1 003 400
....	...	"	"	"	1 003 401
....	...	"	"	"	1 100 865
....	...	"	"	"	1 099 587
....	...	"	Low	"	1 003 396
....	...	"	"	"	1 003 397
....	...	"	"	"	1 003 398
....	...	"	"	"	1 003 399
....	...	"	"	"	1 003 400
....	...	"	"	"	1 003 401
....	...	"	"	"	1 100 865
....	...	"	"	Latching	1 003 396
....	...	"	"	"	1 003 397
....	...	"	"	"	1 003 398
....	...	"	"	"	1 003 399
....	...	"	"	"	1 003 400
....	...	"	"	"	1 003 401
....	...	"	"	"	1 100 865
....	...	"	"	"	1 099 587
to 160	115	60	High	Non-Latching	1 003 403
"	"	50	"	"	1 003 404
"	"	25	"	"	1 003 405
to 150	125	D.C.	"	"	1 003 406
to 160	115	60	Low	"	1 003 403
"	"	50	"	"	1 003 404
"	"	25	"	"	1 003 405
to 150	125	D.C.	"	"	1 003 406
to 160	115	60	"	Latching	1 003 403
"	"	50	"	"	1 003 404
"	"	25	"	"	1 003 405
to 150	125	D.C.	"	"	1 003 406

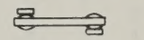
FIG. 22 RADIO TRANSMITTER BC-365-C, OVERLOAD RELAY

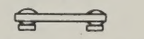
TYPES SC, SC-1, SV, SV-1 RELAYS

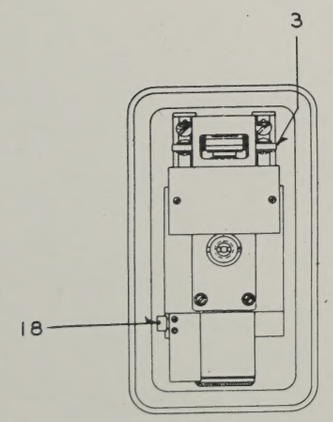
New Design with Pick-up Adjustment by Means of Flux Shunt

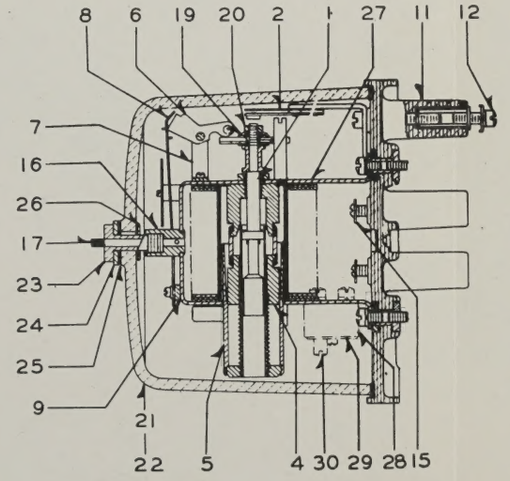



TWO MAKE


ONE MAKE
&
ONE BREAK


TWO BREAK



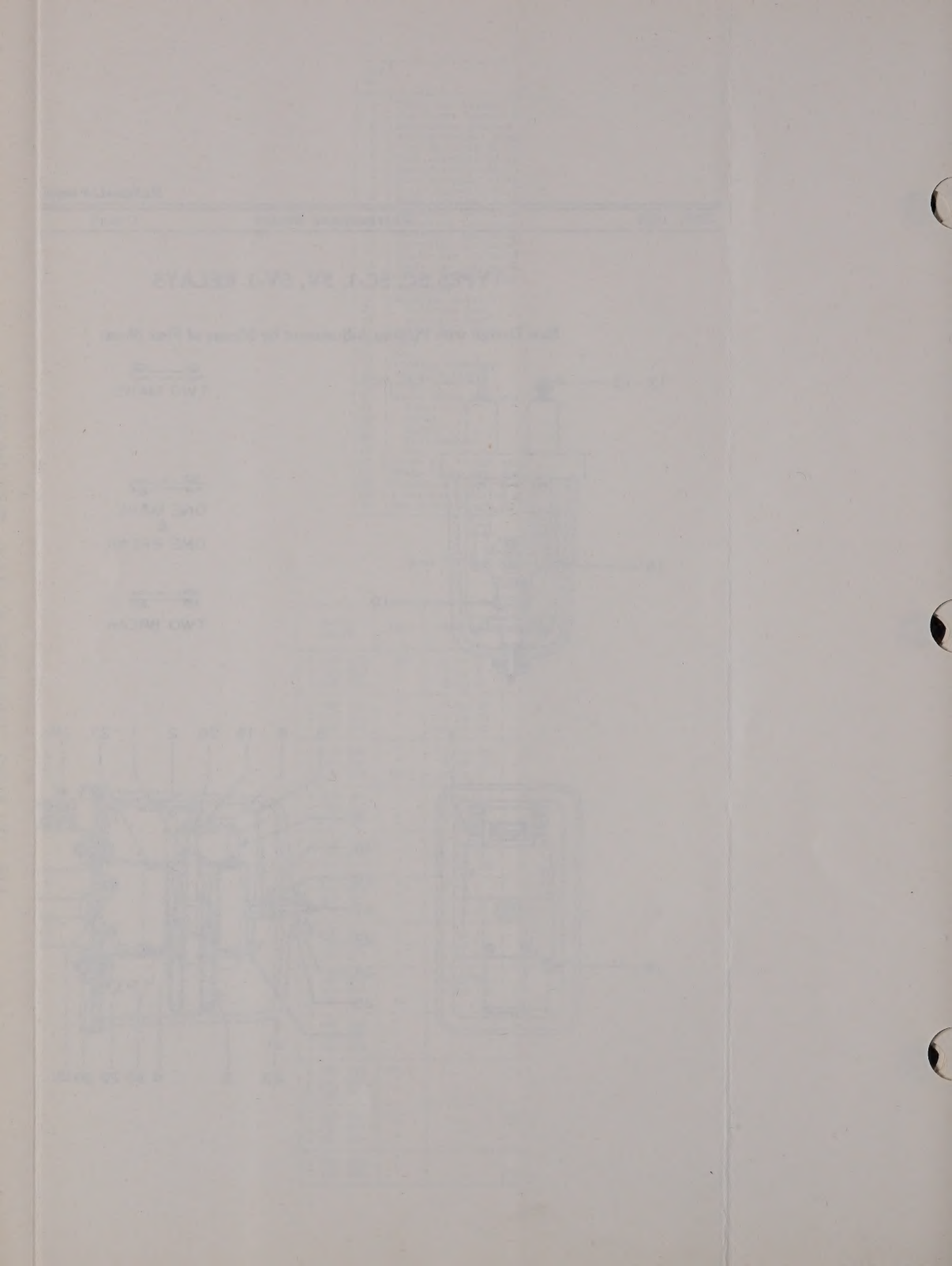


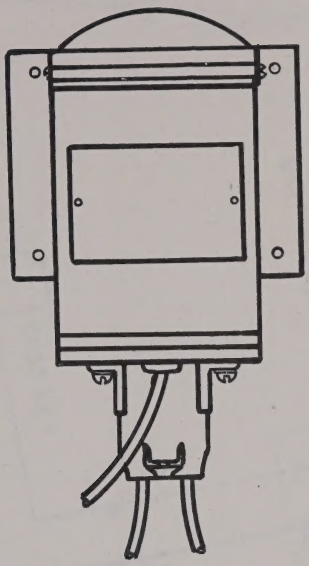
Ref No.	DESCRIPTION OF PART	Style Number	No. Req
1	Shaft and Plunger SC and SC-1 and DC Types SV-SV-1	1 097 224	1
1	Shaft and Plunger AC Types SV and SV-1	1 097 223	1
2	Stationary Contact	1 097 234	2
3	Moving Contact Complete	1 055 993	1
4	Core Assembly SC and DC Type SV	1 097 225	1
4	Core Assembly AC Type SV	1 097 226	1
4	Core Assembly SC-1 and DC. Type SV-1	1 097 227	1
4	Core Assembly AC Type SV-1	1 097 228	1
5	Shunt Assembly SC, SC-1 and DC Types SV and SV-1	1 097 230	1
5	Shunt Assembly AC Types SV and SV-1	1 097 231	1
6	Operation Indicator for non-latching relays	1 002 165	1
6	Operation Indicator for latching relays	1 002 164	1
7	Operation Indicator Bracket	704 869	1
8	Operation Indicator Spring	1 002 163	1
9	Spacer for indicator spring	1 002 167	2
10	Shaft for indicator	818 876	1
*	Spacer for mounting nameplate	1 009 565	2
11	Terminals	821 998	6
12	Mounting Details	839 114	1
13	Terminal Stud	839 582	6
14	Mounting Stud	837 331	2
15	Washer Head Screws	1 009 296	4
16	Stud	704 861	1
17	Pin	704 873	1
18	Locking Assembly	1 097 368	1
19	Spring Washer	321 406	1
20	Nut	1 098 008	1
21	Glass Cover Complete	629 939	1
22	Glass Only	704 876	1
23	Screw	704 877	1
24	Washer	837 815	1
25	Felt Washer	17 937	1
26	Nut	704 878	1
27	Frame all relays except 4-100 A Range	1 001 874	1
27	Frame 4-100 Amp. Range Only	1 097 491	1
28	Connector Block SC and SC-1 4-100 Amp. Range	837 805	1
29	Connector Plate SC and SC-1 4-100 Amp. Range	837 817	1
30	Tap Screw SC and SC-1 4-100 Amp. Range	717 064	1

* Not Illustrated
Order Parts by Style Number and Description
Parts indented are included in the Part under which they are indented

Relay Style	Type	Amperes	Operating Voltage Limits	Rated Voltage	Cycles	Ratio	Latching or Non-Latching	Coil Style Number
1 096 937	SC	.5 to 2	....	...	Ac - Dc	High	Non-Latching	1 003 396
1 096 938	"	1 to 4	....	...	"	"	"	1 003 397
1 096 939	"	2 to 8	....	...	"	"	"	1 003 398
1 096 940	"	4 to 16	....	...	"	"	"	1 003 399
1 096 941	"	10 to 40	....	...	"	"	"	1 003 400
1 096 942	"	20 to 80	....	...	"	"	"	1 003 401
1 100 866	"	40 to 160	....	...	"	"	"	1 100 865
1 094 830	"	4 to 100	....	...	"	"	"	1 099 587
1 096 943	SC-1	.5 to 2	....	...	"	Low	"	1 003 396
1 096 944	"	1 to 4	....	...	"	"	"	1 003 397
1 096 945	"	2 to 8	....	...	"	"	"	1 003 398
1 096 946	"	4 to 16	....	...	"	"	"	1 003 399
1 096 947	"	10 to 40	....	...	"	"	"	1 003 400
1 096 948	"	20 to 80	....	...	"	"	"	1 003 401
1 100 867	"	40 to 160	....	...	"	"	"	1 100 865
1 096 949	"	5 to 2	....	...	"	"	Latching	1 003 396
1 096 950	"	1 to 4	....	...	"	"	"	1 003 397
1 096 951	"	2 to 8	....	...	"	"	"	1 003 398
1 096 952	"	4 to 16	....	...	"	"	"	1 003 399
1 096 953	"	10 to 40	....	...	"	"	"	1 003 400
1 096 954	"	20 to 80	....	...	"	"	"	1 003 401
1 100 868	"	40 to 160	....	...	"	"	"	1 100 865
1 100 864	"	4 to 100	....	...	"	"	"	1 099 587
1 096 955	SV	....	70 to 160	115	60	High	Non-Latching	1 003 403
1 096 956	"	....	"	"	50	"	"	1 003 404
1 096 957	"	....	"	"	25	"	"	1 003 405
1 096 958	"	....	50 to 150	125	D.C.	"	"	1 003 406
1 096 959	SV-1	....	70 to 160	115	60	Low	"	1 003 403
1 096 960	"	....	"	"	50	"	"	1 003 404
1 096 961	"	....	"	"	25	"	"	1 003 405
1 096 962	"	....	50 to 150	125	D.C.	"	"	1 003 406
1 096 963	"	....	70 to 160	115	60	"	Latching	1 003 403
1 096 964	"	....	"	"	50	"	"	1 003 404
1 096 965	"	....	"	"	25	"	"	1 003 405
1 096 966	"	....	50 to 150	125	D.C.	"	"	1 003 406

FIG. 22 RADIO TRANSMITTER BC-365-C, OVERLOAD RELAY

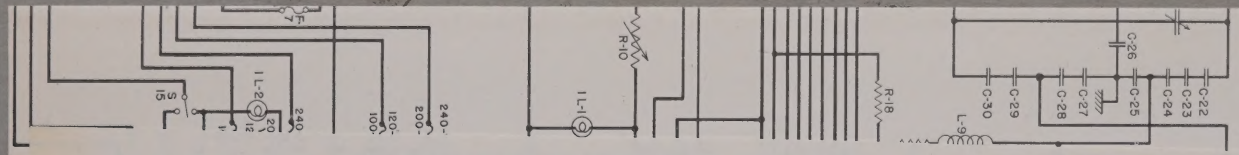


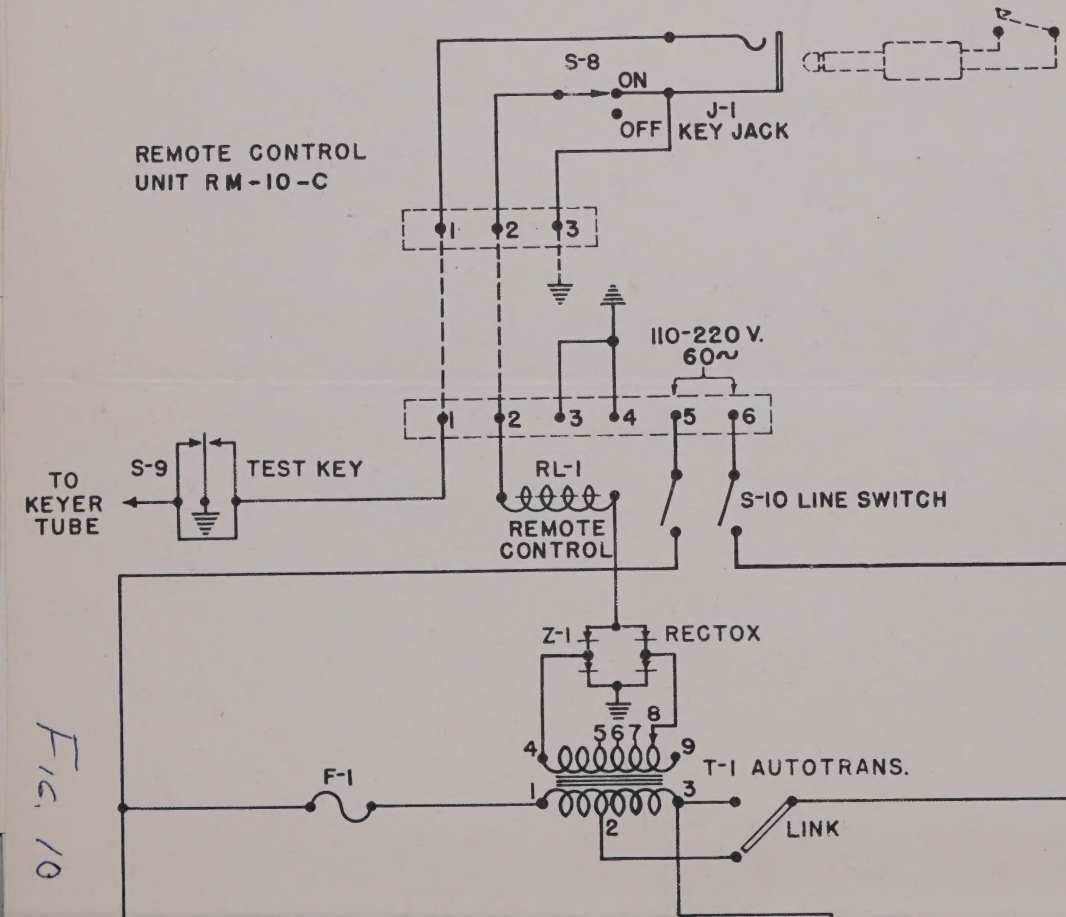


RELAY ASSEMBLY	RELAY PART NO.	COIL NO.	CONTACT NO.
902-72-1	463289	187-1-147	463266

ADAMS & WESTLAKE CO.
TIME DELAY RELAY.

FIG. 23 RADIO TRANSMITTER BC-365-C, TIME DELAY RELAY


S-15
I L-2
240
120-
100-
200-
240-
R-10
I L-1
R-18
L-9
C-30
C-29
C-28
C-27
C-26
C-25
C-24
C-23
C-22


S-8
ON
OFF
J-1
KEY JACK
REMOTE CONTROL
UNIT RM-10-C
1
2
3
110-220 V.
60~
4
5
6
TO
KEYER
TUBE
S-9
TEST KEY
RL-1
REMOTE
CONTROL
S-10 LINE SWITCH
Z-1
RECTOX
8
5
6
7
4
9
T-1 AUTOTRANS.
F-1
LINK

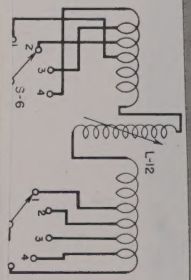

S-6
L-12

FIG. 10

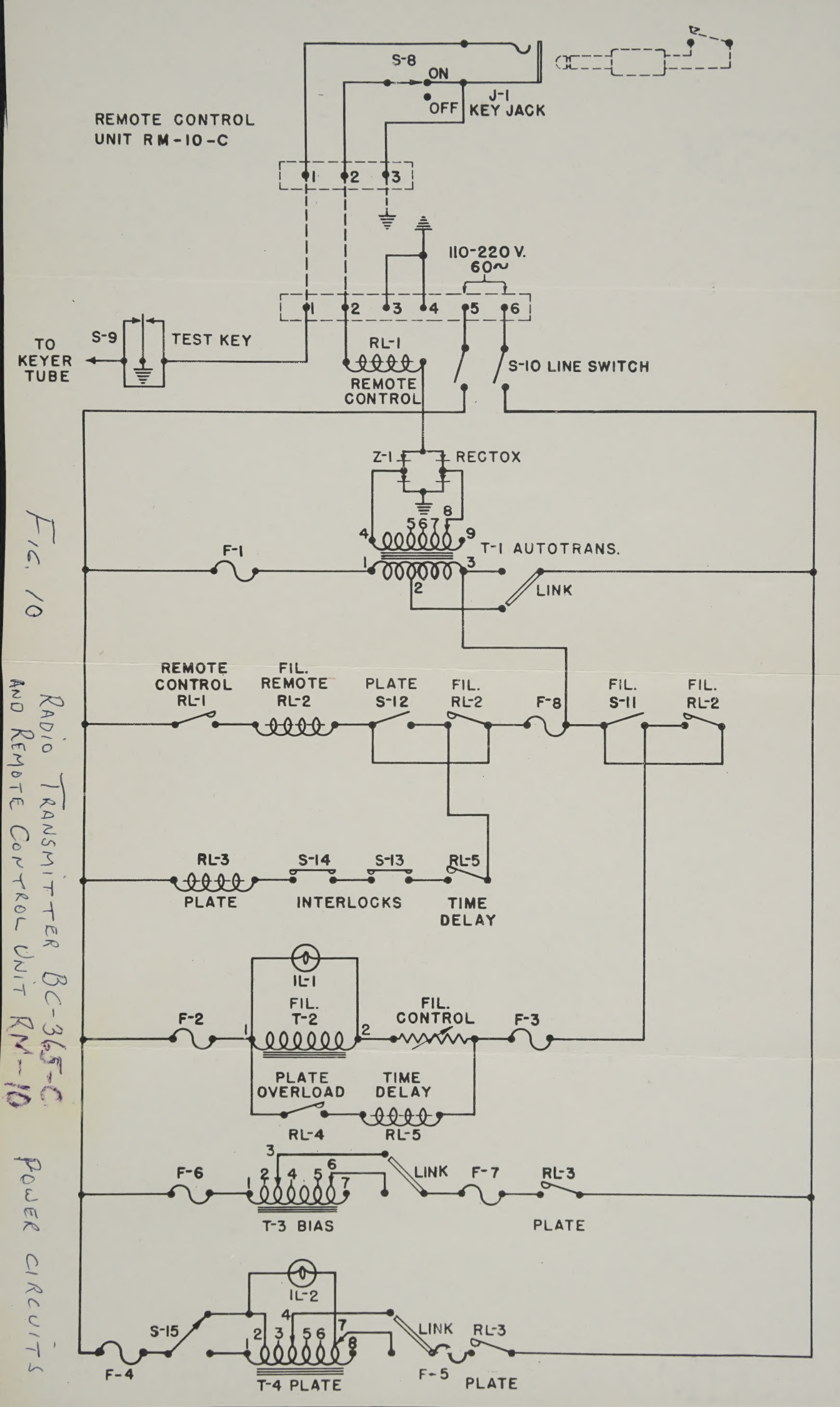
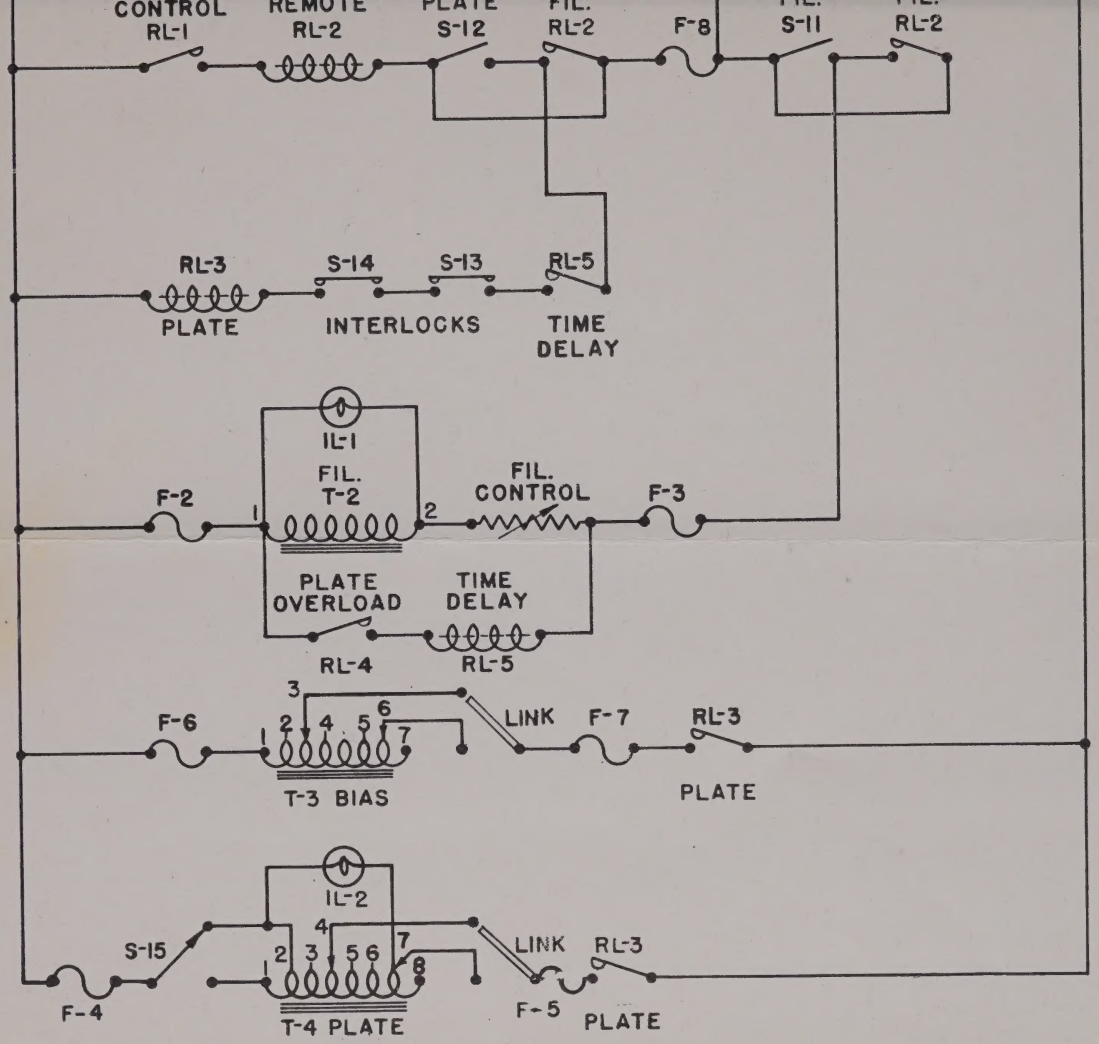


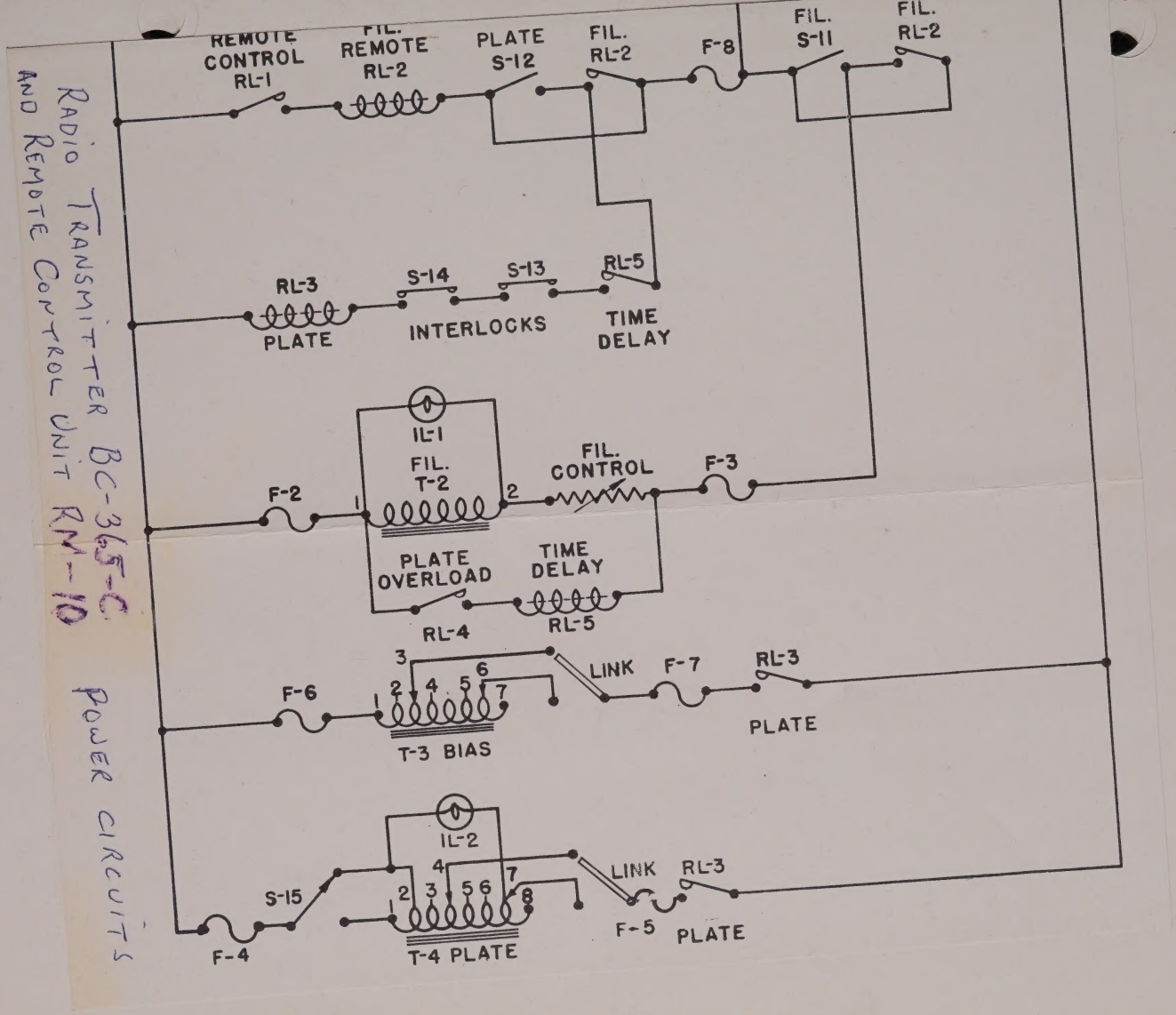
FIG. 10

RADIO TRANSMITTER BC-375-C AND REMOTE CONTROL UNIT RM-10 POWER CIRCUITS



RADIO TRANSMITTER BC-375-C
AND REMOTE CONTROL UNIT RM-10
POWER CIRCUITS

TRANSMITTER RC-356 & AND REMOTE CONTROL UNIT BM-10-C SCHEMATIC WIRING DIAGRAM



RADIO TRANSMITTER BC-365-C AND REMOTE CONTROL UNIT RM-10 POWER CIRCUITS

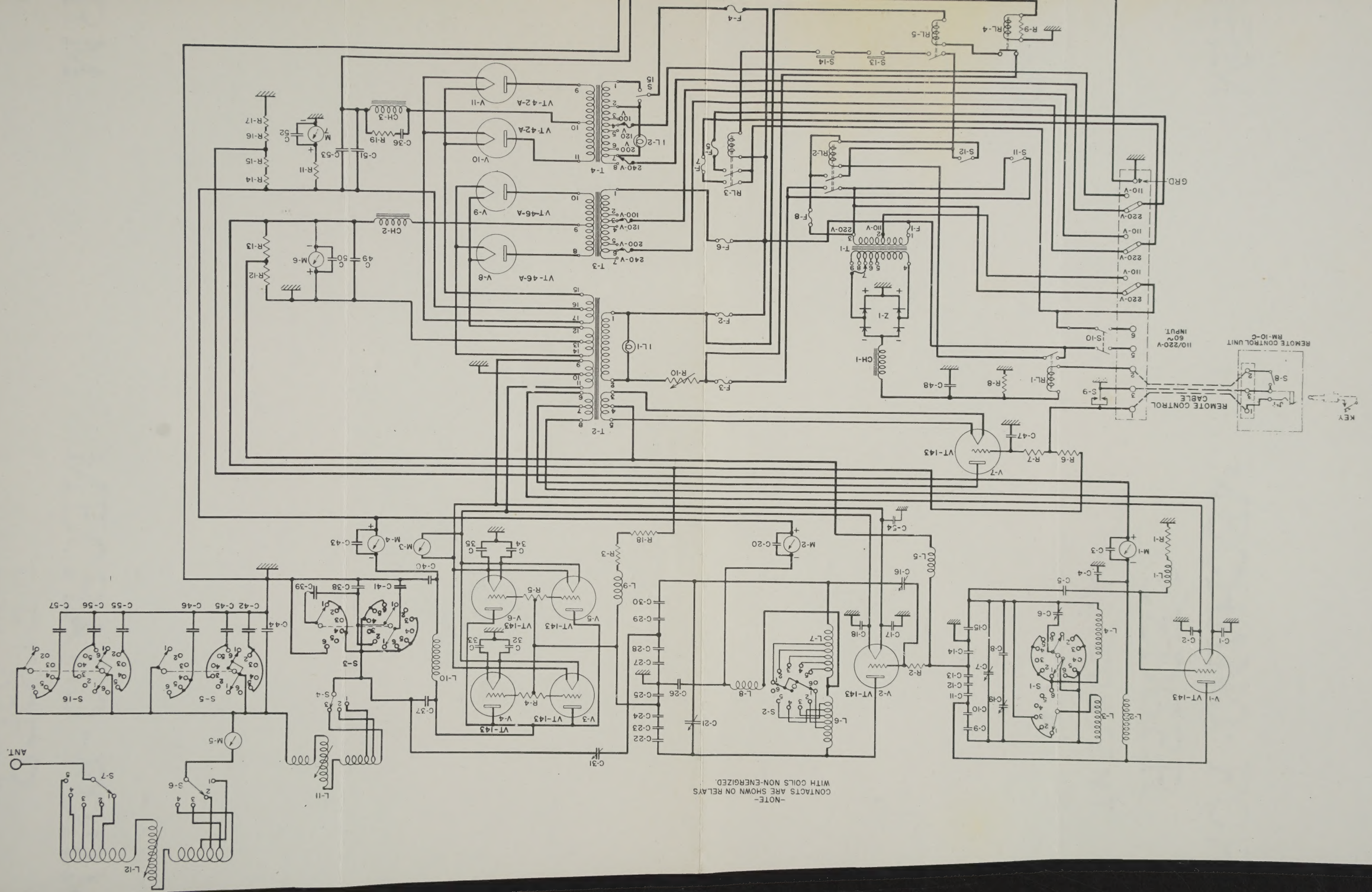
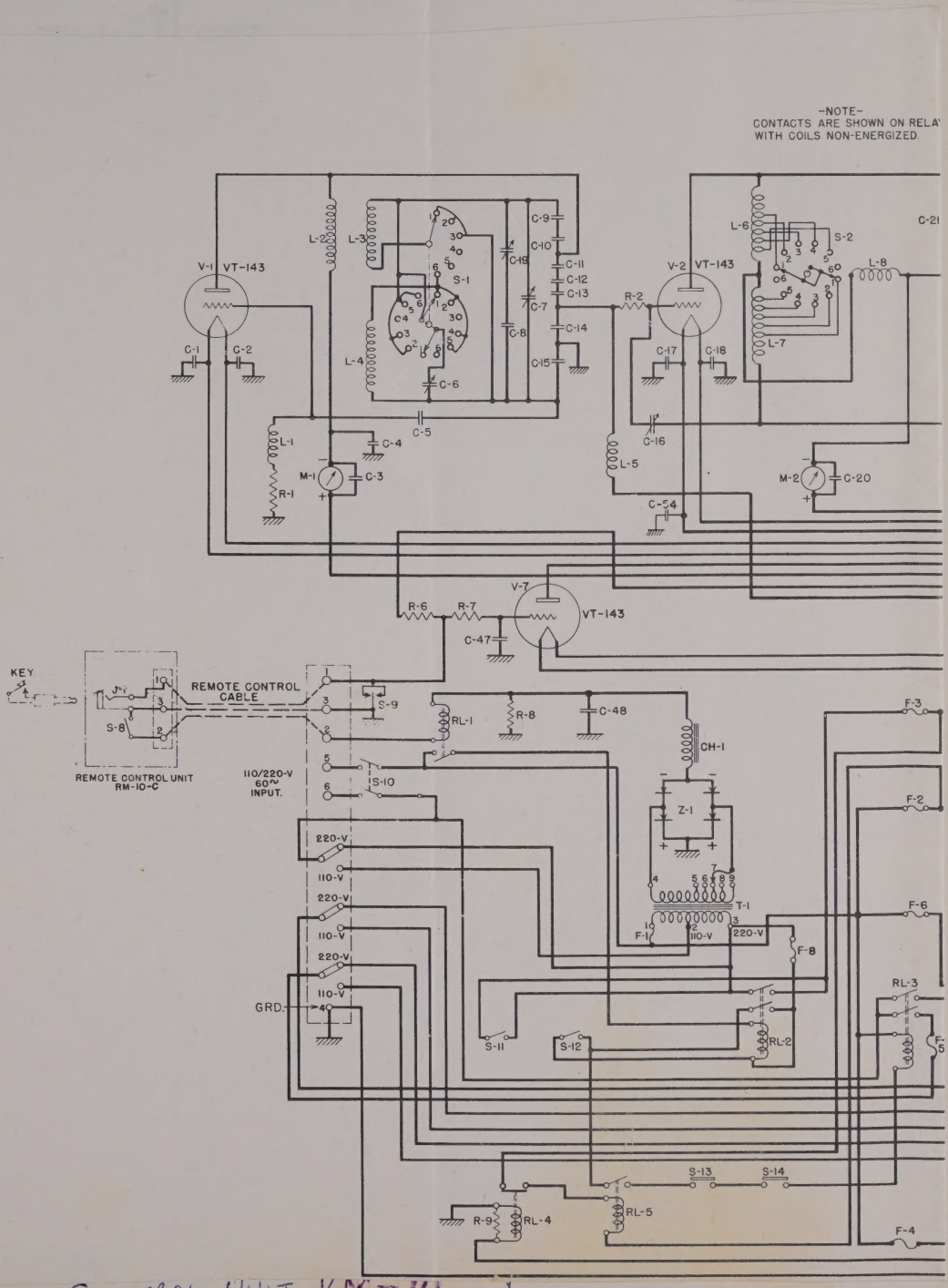
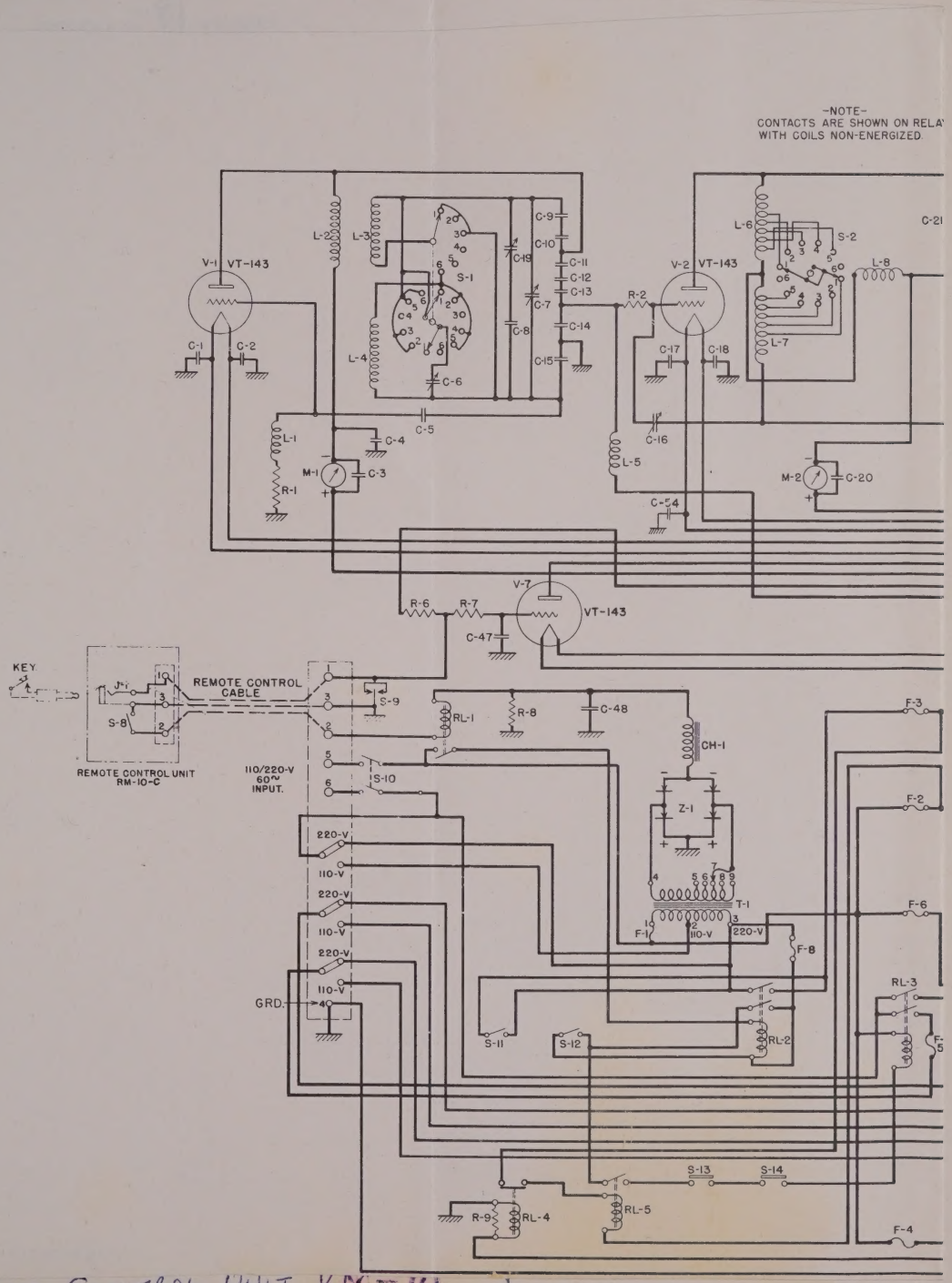


FIG. 11 RADIO TRANSMITTER BC-365-C AND REMOTE CONTROL UNIT RM-10-C, SCHEMATIC WIRING DIAGRAM

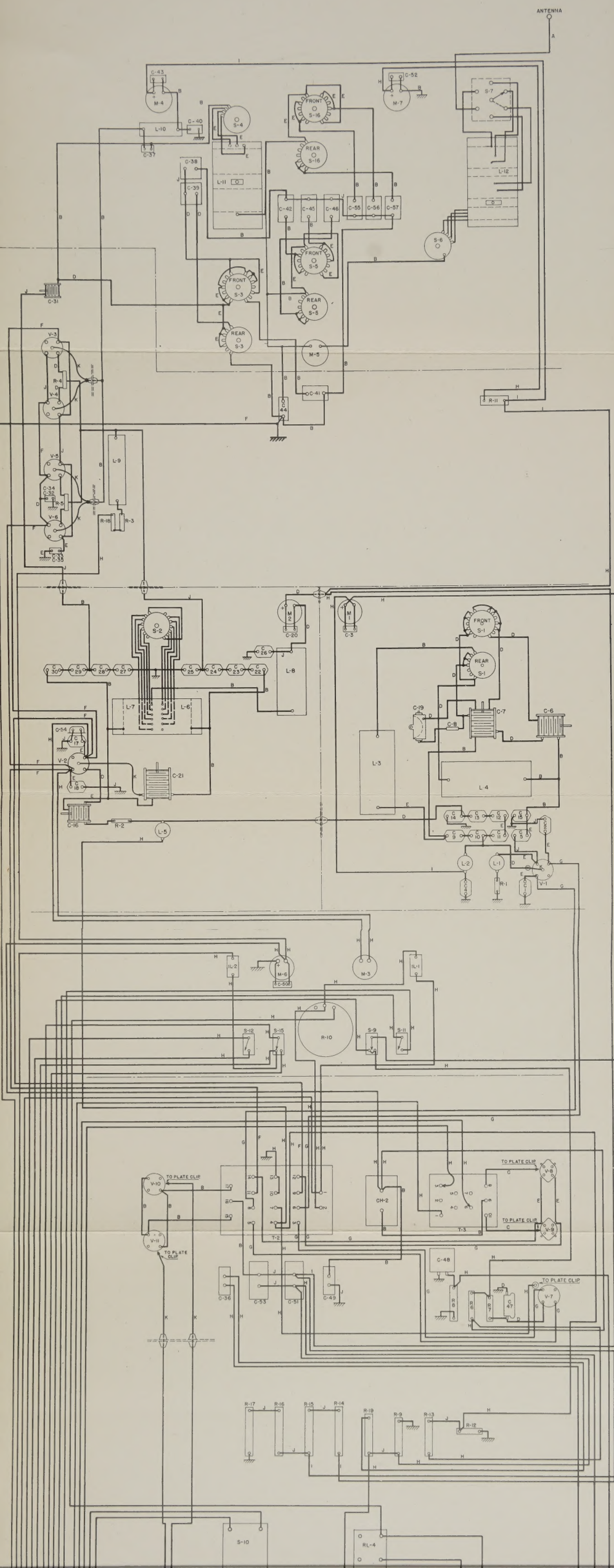


KAD
AND REMOTE CONTROL UNIT KM-10

FIG. 12 RADIO TRANSMITTER BC-365-C, PRACTICAL WIRING DIAGRAM



KAD
AND REMOTE CONTROL UNIT KM-10


ANTENNA
C-43
M-4
L-10
C-40
S-4
C-37
C-38
C-39
L-11
C-52
M-7
FRONT
S-16
REAR
S-16
S-7
L-12
C-42
C-45
C-46
C-55
C-56
C-57
S-6
FRONT
S-5
REAR
S-5
FRONT
S-3
REAR
S-3
C-31
M-5
C-41
C-44
R-11
V-3
R-4
V-4
V-5
C-34
C-32
R-5
V-6
C-33
L-9
R-18
R-3
S-2
M
C-20
C-26
L-8
C-29
C-28
C-27
C-25
C-24
C-23
C-22
L-7
L-6
C-14
C-17
V-2
C-18
C-21
C-16
R-2
L-5
M
C-3
FRONT
S-1
REAR
S-1
C-19
C-8
C-7
C-6
L-3
L-4
C-14
C-13
C-12
C-15
C-9
C-10
C-11
C-5
L-2
L-1
R-1
V-1
IL-2
M-6
C-50
M-3
IL-1
S-12
S-15
R-10
S-9
S-11
TO PLATE CLIP
V-10
V-11
TO PLATE CLIP
CH-2
T-2
T-3
TO PLATE CLIP
V-8
TO PLATE CLIP
V-9
C-48
TO PLATE CLIP
V-7
C-36
C-53
C-51
C-49
R-17
R-16
R-15
R-14
R-19
R-9
R-13
R-12
S-10
RL-4

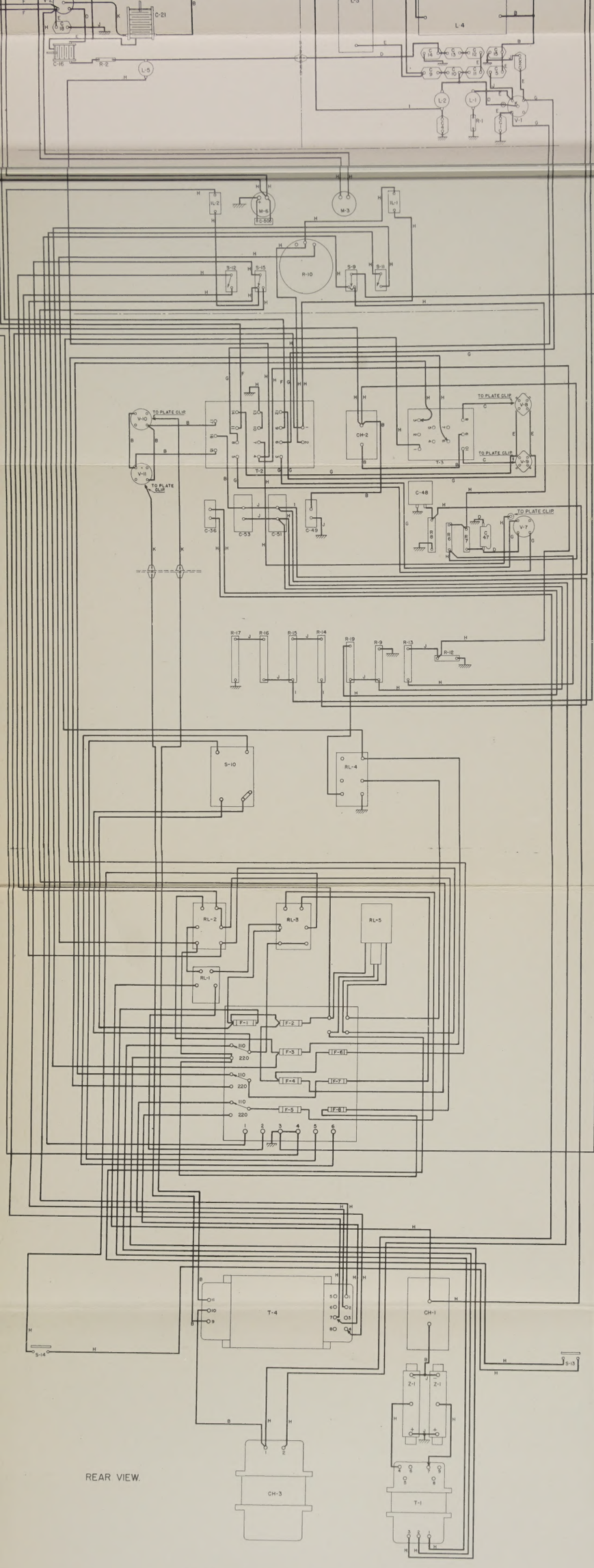

REAR VIEW.
A-1/4 O.D. x 3/32 I.D. COPPER TUBING.
B-3/16 O.D. x 1/8 I.D. COPPER TUBING.
C-7 mm H.T. IGNITION CABLE.
D-#10 B&S GA. BARE TINNED COPPER WIRE.
E-#12 B&S GA. BARE TINNED COPPER WIRE.
F-#10 B&S GA. VARNISHED CAMBRIC, 600 VOLT WIRE, PER. SPEC. F-7600-4-4.
G-#12 B&S GA. VARNISHED CAMBRIC, 600 VOLT WIRE, PER. SPEC. F-7600-4-3.
H-#14 B&S GA. VARNISHED CAMBRIC, 600 VOLT WIRE, PER. SPEC. F-7600-4-2.
I-#12 B&S GA. VARNISHED CAMBRIC, 2500 VOLT WIRE, PER. SPEC. F-7600-4-57.
J-3/8 x 1/32 COPPER STRIP.
K-1/4 BELDEN BRAID.
L-14 B&S GA. BARE TINNED COPPER WIRE.
M-18 B&S GA. SUPER CORE WIRE.

FIG. 12 RADIO TRANSMITTER BC-365-C, PRACTICAL WIRING DIAGRAM